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DISINFECTION AND DISINFECTANTS*

The Discussion of a Timely Topic—Methods of Using Sulphur Dioxid—Many Valuable Suggestions to Health Officers and Sanitarians

By M. J. Rosenau, M. D.†

SULPHUR DIOXID (SO_2) is an efficient surface disinfectant. It is very destructive to animal as well as to vegetable life, and it is this property that makes it of special value in destroying contagion that is spread through the agency of vermin, such as rats, mice, flies, fleas, mosquitos, etc. In this regard it has no superior. Its action as a disinfectant demands the presence of moisture. It cannot be depended upon where penetration is required. It does not kill spores. It is therefore inapplicable to the prevention of the spread of such infections as anthrax, tetanus, or malignant edema; or for the disinfection of bedding, mattresses, pillows, blankets, fabrics, and similar articles needing more than a mere surface purification.

SOME ADVANTAGES OF SULPHUR DIOXID

Sulphur dioxid possesses the advantage of being efficient, cheap, and readily procurable. There is hardly a cross-road store in the country where a reasonable quantity of sulphur, either in the form of flowers or in rolls or sticks under the name of brimstone, cannot be obtained. The small amount required to disinfect large cubic areas renders the process comparatively cheap, and specially applicable to the holds of ships, freight cars, granaries, stables, outhouses, and similar large rough structures—particularly if infested with vermin.

The disadvantages of sulphur dioxid as a disinfecting agent are such as to contract its application to rather narrow limits. It bleaches all coloring matter of vegetable origin and many anilin dyes, and attacks almost all the metals. It acts upon cotton and linen fabrics so as to seriously weaken their tensile strength.

Sulphur dioxid is a heavy, colorless, irrespirable gas, with a peculiar suffocating odor and irritating properties. It has a density of 2.4; a liter weighs 2.86 grams; 100 cubic inches weigh 68.89 grams. On account of the heavy specific gravity of sulphur dioxid as compared to air, it diffuses slowly, which partly accounts for its inferior penetrating power as a disinfectant.

Cold water takes up more than thirty times its volume of sulphur dioxid. The solution contains hydrogen sulphite of sulphurous acid (H_2SO_3) and it is in reality this acid that is the disinfecting agent. Dry or anhydrous sulphur dioxid was found by Geddings to be practically inert so far as its effect upon micro-organisms is concerned. He found that an atmosphere containing as much as 10 per cent. of the dry sulphur dioxid has no effect upon anthrax, cholera, the colon bacillus, typhoid, diphtheria, or the Bacillus icteroides of Sanarelli, after forty-eight hours exposure; while an atmosphere containing only 0.6 per cent. of the gas plus moisture showed active germicidal effects upon non-spore-bearing organisms after twenty-four hours contact; 1.6 per cent. was equally effective in eighteen hours, and 4.25 per cent. in sixteen hours.

The watery solution of sulphur dioxid consisting of sulphurous acid remains unchanged so long as air is excluded, but when exposed to the oxygen of the air, it is converted into sulphuric acid (H_2SO_4) and it is these two acids that have such a destructive effect upon the fibre and colors of fabrics. Cotton and linen that have been exposed to sulphur dioxid in the presence of moisture become so weakened that they tear readily. Sulphur fumigation is therefore not applicable to such materials.

Sulphur dioxid may readily be condensed into a clear liquid by either cold or pressure or a combination of both. At ordinary atmospheric pressure it condenses if the temperature is reduced to 18° C., which is about the temperature of a mixture of ice and salt. At ordinary temperature is liquefies if the pressure is raised to about four atmospheres—i. e., 60 pounds.

This liquid is a stable substance when kept well sealed and protected from the action of the air. It rapidly volatilizes by pouring it into an open vessel. It is now found in commerce and is a good method of producing the gas for disinfecting purposes.

The sulphurous and sulphuric acids which are produced by sulphur dioxid in the presence of moisture and oxygen attack almost all the ordinary metals. Therefore metal objects should be removed from the room that it is to be disinfected. If they are fixtures, they may be protected by greasing them with vaselin.

The complete combustion of one pound of sulphur in a space of 1,000 cubic feet will produce 1.15 per cent. of sulphate dioxid. But this amount cannot be obtained in practice because the sulphur of commerce contains impurities, such as sulphate of lime and sand, and a portion is always oxidized to the formation of ill-defined compounds. Therefore one pound may be considered as producing approximately one per cent. of the gas by being burned in 1,000 cubic feet of space, and five pounds will produce about five per cent. This

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* We have been extremely fortunate in securing the permission of the publishers of "Disinfection and Disinfectants," Messrs. P. Blakiston's Son & Co., of Philadelphia, to publish this extract from that work. It is the discussion of a timely topic, particularly at this season of the year, and one which will interest many others besides health officers and sanitarians. The work has 353 pages, is well illustrated, and supplied with a good index which makes it possible to refer to any topic immediately. It is a practical guide for sanitarians, health and quarantine officers. The author has taken up the subject in the most advantageous manner, considering it "from the standpoint of the disinfectant used, the object to be disinfected and the disease for which the disinfection is done." The chapter divisions are: 1, Physical Agents; 2, Gaseous Disinfectants; 3, Chemical Solutions; 4, Insecticides Applied to Disinfection Against the Insect-Borne Diseases; 5, Disinfection of Houses, Ships and Objects; 6, Disinfection for the Communicable Diseases. The work is neatly bound in cloth and sells for $2 net.

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SULPHUR DIOXID IN SIPHON

is the amount found by experiment to be sufficient to kill all the non-spore-bearing organisms after sixteen hours' exposure.

The amount of moisture necessary to convert the sulphur dioxid into sulphurous acid is readily computed. It will be found that one-fifth of a pound, theoretically, of water should be volatilized or added for each pound of sulphur burned. The water may be added in the form of steam, or it may be added after the combustion of the sulphur, or in the form of a finely divided spray; or it may be vaporized by the heat generated by the combustion of the sulphur itself. The latter method is the one that will commend itself in practical use and is described under the pot method.

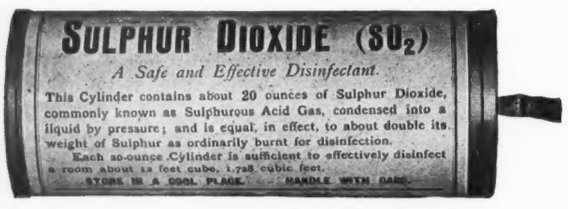
In disinfecting with sulphur dioxid it is necessary to tightly seal the room. The gas is disengaged so slowly that much of it will escape through small openings, specially near the floor. All the cracks and keyholes must be stuffed with a suitable material or pasted with paper. Paper should be pasted all about the windows and doors. Of course, radiators, ventilators, and fireplaces must be kept closed by means that will readily present themselves. In cold weather the heating of the rooms by any means at hand will greatly aid the disinfection of the gas.

Sulphur dioxid is very fatal to animal life. It quickly kills rats, mice, rabbits, guinea-pigs, cats, roaches, fleas, mosquitoes, and all kinds of insects. It is therefore a valuable means of ridding a confined space of all sorts of vermin. It is invaluable for this purpose in the disinfection of granaries, ships, and structures for plague, as well as rooms and wards for yellow fever and malaria.

There are three well-recognized methods of fumigation with sulphur dioxid, viz.: 1, The pot method; 2, Liquid sulphur dioxid; 3, The sulphur furnace.

The Pot Method

The pot method is at once the easiest, cheapest, and probably the most efficient method of disinfecting with sulphur dioxid. The only materials repired are iron pots and some sulphur. The best way to apply the method is by placing the sulphur in large, flat, iron pots, known as Dutch ovens. Not more than thirty pounds of sulphur should be placed in each pot. The sulphur is preferably used in the form known as flowers of sulphur. If it is in sticks or rolls it should be crushed into powder, which may conveniently be done by placing the sulphur in a stout box and pounding the lumps with a heavy timber. The pot holding the sulphur should be placed in a tub of water, as shown in the sketch. The water not only diminishes the danger from fire, but by its evaporation furnishes the moisture necessary to hydrate the sulphur dioxid upon which the disinfecting power of the gas depends. The great advantage of this method is that the moisture is furnished automatically and it does away with the necessity for its introduction by means of steam or spray. Although the specific gravity of sulphur dioxid is heavier than that of air, when hot it rises aided by the upward current produced by the burning sulphur. Therefore the pots should not be on the floor, or bottom of the hold in case of vessels, for fear of the cold gas settling, and by depriving the flame of oxygen cause it to become extinguished before all the sulphur is burned. In rooms and freight cars, the pots are best placed upon a table or box, and in the holds of ships upon piles of ballast, or on the "'tween decks."



LIQUEFIED SULPHUR DIOXID IN TIN CANS

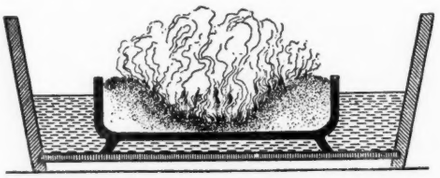
The sulphur may be lighted by means of hot coals or a wood fire, or any other convenient means. But the most reliable way to get it well lighted is by alcohol. Make a little crater in the sulphur as shown in the accompanying diagram, saturate liberally with alcohol, and light. The sulphur then burns in the centre, and, as it melts, runs down from the sides to form a little lake at the bottom of the crater. If the sulphur is heaped up in a mound in the pot the flame is apt to go out.

Upon the principle of not putting all our eggs into one basket, it it best to have a number of pots. Each pot should not contain more than thirty pounds of sulphur, and the pots should be well distributed in various portions of the space to be disinfected. Use five pounds of the sulphur for each 1,000 cubic feet of space. Four pounds are theoretically sufficient to produce four per cent. of sulphur dioxid, but the extra pound is for the inevitable wastage. Some of the sulphur always remains unconsumed, and there is always considerable loss by leakage and absorption of the gas.

The time required for sulphur dioxid to act varies with the purpose for which it is used. For the destruction of vermin or animal life *two* hours' exposure is ample. For the destruction of bacterial infection sixteen to twenty-four hours' exposure is necessary.

Liquid Sulphur Dioxid

Liquid sudphur dioxid, commonly known as sulphurous acid gas, through an efficient method of applying sulphur dioxid to the disinfection of large spaces, is about ten times as expensive as burning sulphur by the pot method. It has the advantage of liberating a large volume of gas rapidly, thereby diffusing the gas more quickly to all parts of a room than is possible with the slower methods of combustion of the sulphur either by the pot method or by the furnace. This is a great advantage in a gaseous disinfectant, because by the slower method of production the gas not only diffuses slowly and imperfectly into dead spaces, but much is lost through the cracks and pores, some of the gas is dissolved by the water and moisture that may be present, and lost in other ways, so that there is a gradual diminution of its amount. On account of this loss the desired percentage may not be obtained in the slower methods of its evolution. The use of liquefied sulphur dioxid also has the advantage of avoiding the danger of accidental fire.



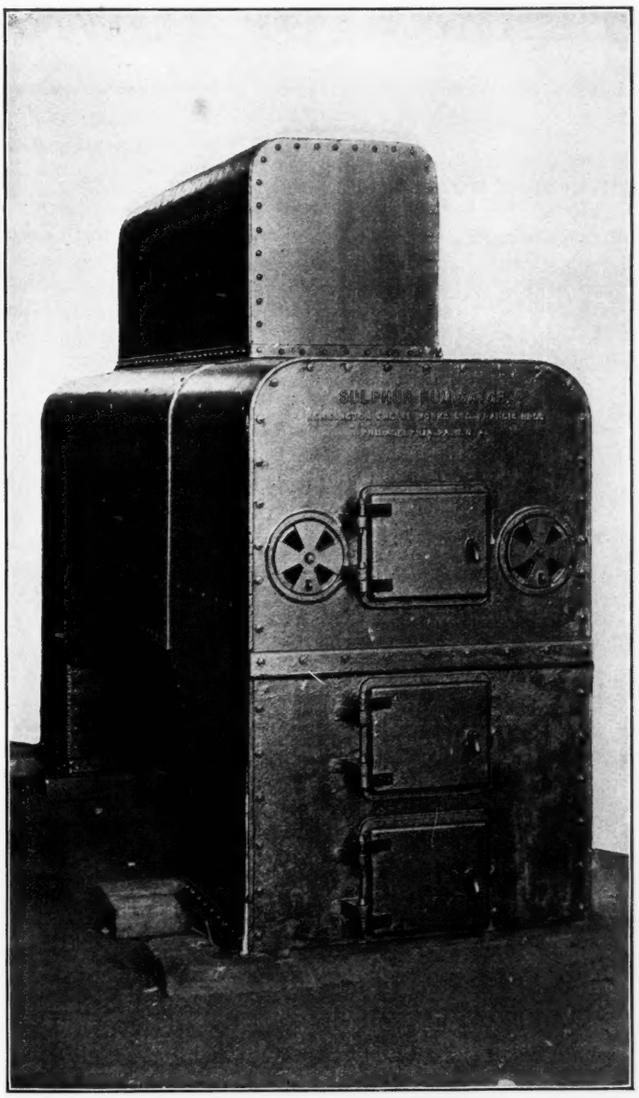
THE POT METHOD OF BURNING SULPHUR

One pound of sulphur (atomic weight, 32) will produce about two pounds of sulphur dioxid (atomic weight, $S_{32} + O_2 32 = 64$); therefore twice as much by weight of the liquid dioxid is necessary in practical disinfection that is, instead of using five pounds of sulphur, it is necessary to use ten pounds of the liquefied gas per 1,000 cubic feet.

The method of using the liquid sulphur dioxid is very simple. If the substance is used in the small tins, it is only necessary to cut simultaneously the leaden pipes in the tops of the necessary number of cans, and invert the latter in an ordinary washbowl or iron pot, when volatilization rapidly occurs. The operator must act quickly and be prepared to immediately leave the room and shut the door. If the substance is contained in glass or metallic siphons, the necessary amount of liquid sulphur dioxid can be projected from the outside through a small pipe passed through the keyhole, or other small aperture into a suitable receptacle. The internal pressure in the siphon is sufficient for this purpose. In order to obtain the maximum disinfecting power from the sulphur dioxid it is necessary to introduce moisture. This may be done by placing open pans of boiling water in the room, or by injecting steam or a fine spray.

The Sulphur Furnace

The sulphur may be burned in an apparatus of special construction, known as a sulphur furnace, from which the resulting fumes are blown through a system of pipes into the room or hold of a vessel to be disinfected. This method requires expensive and cumbersome machinery and has little to recommend itself over the simpler pot method than that a larger percentage of gas may be obtained in a given space. The pot method, at best, cannot produce an atmosphere containing more than four per cent. of sulphur dioxid, whereas it is theoretically possible to charge a confined space with a high percentage of the gas by means of the furnace. In practice this is not possible without burning a great excess of sulphur and by expending



DOUBLE SULPHUR FURNACE

a very long time to accomplish the end. The fumes first entering diffuse with the air, and as the gas continues to flow into the space, it displaces about an equal quantity of this mixture of sulphur dioxid and air, so that, as a matter of fact, in actual practice only about 2.5 to 6 per cent. of the gas is obtained in the holds of vessels by the sulphur furnace.

It is therefore considered advisable, in using the sulphur furnace, to arrange the opening of the pipe admitting the gas into the room as near the floor as possible. In disinfecting the holds of vessels the pipe is usually let down the hatchway until it is near the bilge. The heavy gas collects at the bottom and gradually ascends, displacing the air, so that it is important to allow an opening of some sort for the exit of the air near the top of the compartment being disinfected. This opening should not be closed until the gas escapes freely, when all is to be made tight, excepting the hose conducting the sulphur dioxid.

The sulphur furnace consists of an iron sulphur pan in which the element is burned. Under this pan is a fire-box with ash-pit and necessary draft. The fire-box is designed to hold a light fire of wood or shavings, and is intended to heat the sulphur pan sufficiently to ignite the sulphur when thrown upon it at the beginning of the operation. This part of the apparatus is entirely unnecessary, for the sulphur may be ignited more simply by means of some alcohol, a few live coals, or a red-hot spike. When once lighted, there is no trouble in keeping the sulphur burning.

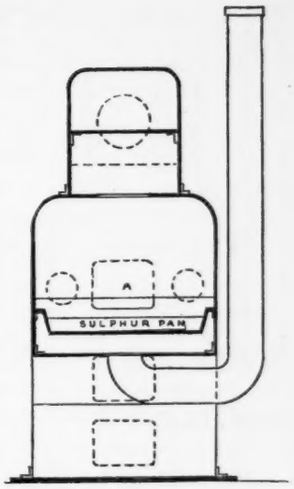


FIG. 44. END VIEW OF SULPHUR FURNACE

The air enters at A (Fig. 45) through a valve arranged to regulate the amount of the flow. It then passes over the burning sulphur in the direction shown by the course of the arrow to the fan. The fumes are compelled to take a devious course around the baffle-plates and angle irons, as shown in the drawing, in order to insure the complete combustion of the oxygen of the air. The angle irons also act as spark-arresters. From B, the fumes are sucked to the fan, which is actuated by a steam-engine or electric motor, and which forces the gas through the pipes to the space to be disinfected.

In using the furnace care must be taken not to run the fan at too high a speed, in which case the oxygen of the air will not all be converted into sulphur dioxid, and furthermore the strong current will carry over a quantity of unconsumed sulphur in a state of fine division. Running the fan at too high a speed also causes overheating of the pipes, or the carrying over of sparks of burning sulphur, thereby rendering possible accidents from fire.

The pipe conducting the fumes from the sulphur furnace to the compartment to be disinfected gives a great deal of trouble. It is apt to become clogged with the sulphur which sublimes in the cooler portions, and unless special care is taken the heat generated is sufficient to burn out and destroy the materials of which the pipe is constructed. Ordinarily this pipe must be 6 to 8 inches in diameter. Rubber hose of this size is not only very costly and heavy, but the sulphur soon vulcanizes the rubber, rendering it brittle and useless. A good pipe for this purpose may be made of light galvanized iron sections two or three feet long joined with copper wire to take the strain and the joint made tight with several layers of canvas, saturated and coated with some fire-proof paint.*

* See the article on this subject in the Annual Report of the Marine Hospital Service for 1897, page 269, by the author.

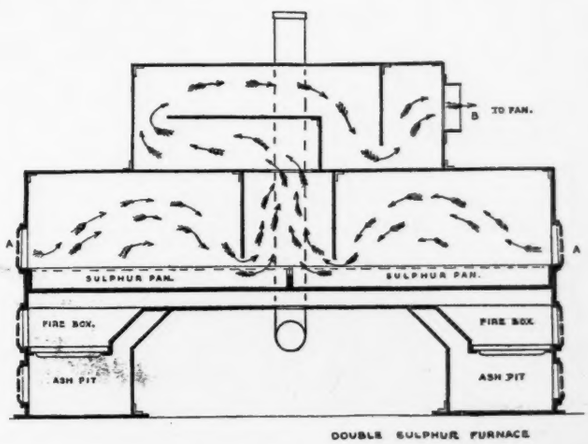


FIG. 45. LONGITUDINAL SECTION THROUGH SULPHUR FURNACE

No arrangement is made in this form of apparatus for adding watery vapor to the sulphur fumes, which is necessary to obtain the maximum disinfecting power of the gas. It is therefore necessary, in dry weather, to add a sufficient quantity of vapor, preferably by means of a steam jet. The air should be saturated. The holds of wooden vessels, in which sulphur fumigation is such a useful disinfecting process, are usually so damp that the addition of more moisture is not necessary.

The portable sulphur furnace depicted in the occompanying illustration is a very useful apparatus in municipal work, particularly for the treatment of sewers warehouses, stables, barns, grain elevators, and similar large rough structures which are infested with vermin.

This form of furnace was used with success in the fight against the rats in the sewers of San Francisco, on account of the plague. It simply consists of the sulphur furnace described above, placed upon a truck, so that it can readily be hauled from place to place. With this apparatus the sulphur dioxid can be forced into out-of-the-way places inaccessible to the pot method. The truck is supplied with a small vertical boiler and steam-engine to actuate the fan.

WATER SUPPLY ENGINEERING FOR TOWNS

Principal Points to Be Considered—Employment of Competent Engineer a Necessity—Considerations of Source of Supply, Cost of Plant, Etc.

By P. Byrne *

THE question of providing a sufficient and healthful supply of water for small towns has received considerable attention from town officials in the South during the last few years, and there have been effectual efforts made to keep up with modern ideas. Several waterworks and sewer systems have been installed recently in towns throughout the South formerly considered not of sufficient wealth to justify the outlay for such plants.

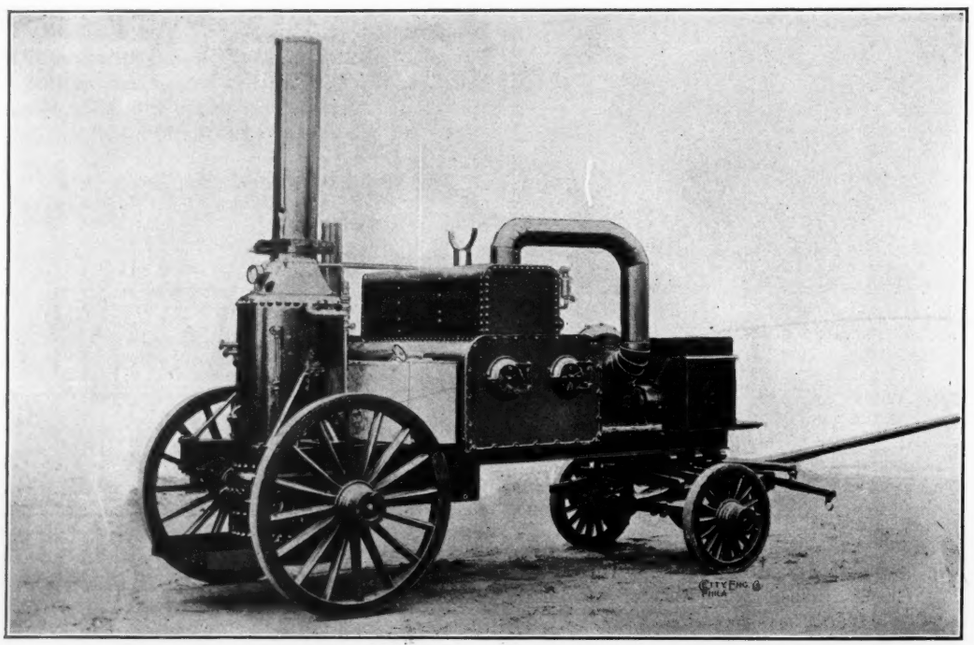
Although we have made considerable progress in the matter of constructing municipal improvements, our smaller towns are still far behind the eastern, middle, and western states in this regard. The people of the southern states formerly were engaged chiefly in agricultural pursuits; the population was in consequence evenly distributed, with small tendency to collect in small towns Thus lack of necessity accounts for our lack of enterprise in providing public conveniences.

Recent growth has changed these conditions, however. The development of manufacturing and other industries has had a tendency to create small towns and make them flourish, and many communities of from 2,000 to 10,000 inhabitants can now be found located or rapidly building up in every southern state. The building of these towns, with their demands for modern improvements, has created an opening for the construction of waterworks, electric light plants, and other municipal works.

WHEN WATERWORKS BECOME A NECESSITY

The first question that presents itself, with reference to providing a system of waterworks for a town, as above described, is, At what period of its growth will it be necessary to make provision to supply a given town with water through a system of pipes? The safe answer would be, Whenever the surface wells become contaminated or unfit for domestic use. It is then time to provide for a purer supply of water, which necessitates the construction of a system of waterworks, taking its supply of pure water for the community from a common source. In an old and slow-growing town the time for making this change may arrive before it has attained a population of 500. It would, perhaps, be a safe rule to adopt that all towns passing the 1,000 mark in population cannot longer afford to use water obtained from shallow, or surface, wells, as such wells

* Member of the Engineering Association of the South, before which this article was first read, and afterward published in the Transactions of the Association, Vol. XIII, here republished by permission.—[EDITOR.



PORTABLE SULPHUR FUMIGATOR, REAR SIDE—*(Disinfection, etc., p. 43.)*

are certain to be so contaminated with seepage as to unfit the water obtained from them to be used for domestic purposes.

A striking case that came under my personal observation was a Mississippi town of 1,200 inhabitants. During the period of a heated canvass for and against waterworks in the month of August there were sixty-four cases of typhoid fever in the town. The water supply was obtained from a system of surface wells, several of them being city wells located at the intersections of streets. The advocates of waterworks were successful, and the system was constructed a few months later. I had occasion to again visit the town, in the month of August, one year later, and found not a case of typhoid fever within the corporate limits. This shows that a town having only 1,200 inhabitants may be in a bad sanitary condition. This particular town should have been provided with a system supplying pure water at a much earlier stage in its growth.

Should Consult with Competent Engineer

When the officials of a town become convinced that it is necessary to provide a purer water supply for its inhabitants, their first action should be to consult with a competent engineer who has had experience in that branch of engineering, and have a study of conditions made, to determine the most suitable system of waterworks for their community. The engineer, before making this report, will carefully examine the town and its surroundings and investigate the different sources of water supply within a reasonable distance of the town and the quality of the water. His experience will enable him to recommend the system best adapted to the needs of the town.

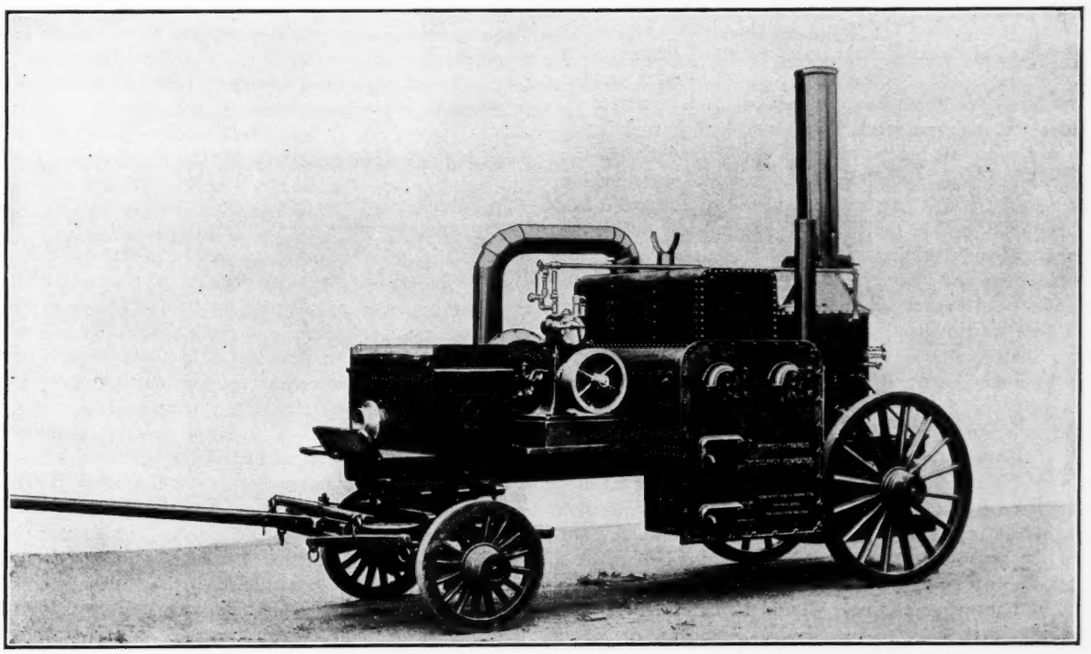
In most cases this course is not followed. If there is a cotton compress, or any other steam plant in the town, the man who fires the boilers is usually consulted as an authority on waterworks. In some cases the town officials take a trip of observation to other towns having waterworks systems, and, after the examination of several plants, at considerable loss of time and money, will return, knowing little more than when they started. As stated above, the only safe method is to engage the services of a competent engineer.

One of the first questions that presents itself is the amount of water it will be necessary to provide to supply the demands of the town, taking into consideration the probable future growth of the place, for which proper provision should be made, in order to avoid the necessity of additions to the plant in the near future. The amount of water necessary to supply the wants of a town is a difficult matter to decide in some cases, and one on which engineers may hold widely divergent opinions. A case in point was a Georgia town of about 4,000 inhabitants, which was considering the erection of a waterworks system. There was available for the supply a spring yielding 86,400 gallons per day, which the writer, acting as consulting engineer, adjudged sufficient for the purpose. The engineer of waterworks of an adjacent city, however, who was called in incidentally, was of the opinion that 125 gallons per capita would be necessary, or 500,000 gallons per day—more than five times as much.

The above town may be taken as representative of towns of its size in the South. Each house was provided with a well or other private water supply. The pipe system proposed was not intended to cover the whole town, probably one-third of the population lying outside. There were some manufacturing establishments, but they were all provided with bored wells and tank arrangements, and it was certain that none of them would take water from the town.

Experience in New England Towns

The New England Waterworks Association gives the consumption of water by fixtures as follows, in gallons daily per capita:



PORTABLE SULPHUR FUMIGATOR, WORKING SIDE—*(Disinfection, etc., p. 43.)*

For each faucet	7.0
For each bath	3.5
For water closet	7.0
For hose	1.1
For stores	3.5

From the above, based on actual, everyday service (which is the only correct method of ascertaining the amount of water used), for domestic use—

	Gallons.
A family of 5 persons will require	35
Or 100 families	3,500
With bath tub	52.5
Or 100 familes	5,250
A family of 5 persons, with bath tub and closet, will use daily	87.5
Or 100 families	8,750
Stores with 5 persons	17.5
Stores with closets	52.5
100 stores, 5 persons	1,750
100 stores, with closets	5,250

Taking the above as a basis for calculations, it is only necessary to ascertain the number of connections to make a fair approximation of the amount of water necessary to supply the town. From previous experience in similar communities, under similar conditions, the town in question will probably make not more than 100 connections in the first year, and probably not more than 250 connections in the first five years. Taking 250 connections as the probable number necessary to estimate on and allowing 50 gallons per day for each connection (which is largely in excess of the above figures, based on actual measurement), the amount of water required in the town for domestic purposes would amount to 12,500 gallons daily. Adding a like amount for sprinkling and other purposes, we find the greatest probable daily demand to be 25,000 gallons. It will be understood that a sewerage system was not contemplated in connection with the above plant.

The Source of Supply

The next matter the consulting engineer must consider, after ascertaining approximately the quantity of water required, will be the source of supply; its selection will require the exercise of his best judgment, for on it the success of the plant will largely depend. The most important point to be considered in selecting the source of supply for a town is its purity. The health of the inhabitants takes precedence over all other considerations; convenience of location and quantity available properly take a second place. The River Pollution Commission of Great Britain, after years of investigation on the subject, summarizes as follows the various sources of supply: "Wholesome, springs and deep wells; suspicious, surface or stored rain water; dangerous, river or creek water and shallow wells."

In the older and more settled portions of the United States the question of pure water supply for towns has received considerable attention in later years; and it has been considered of such vital importance to the public health that several states have taken the matter up as a question pertaining to the public welfare which the state should look after and regulate. Commissions have been appointed to examine and report on the healthfulness of the water supply of the towns within their respective states and to formulate laws to prevent their pollution. These precautions have reduced the death rate in many towns from 25 per cent. to 40 per cent. below the rates prevailing before the commissions were created. In states having commissions such as described, new sources must receive the approval of the commission before being used for domestic supply.

In the southern states we have not learned the necessity of such commissions to guard against this menace to public health, and the burden falls on the consulting engineer who is engaged to make a study of the conditions for any given community. Taking this view of the subject, the consulting engineer should be careful in adopting or recommending the source of supply. Branches, or small creeks, are classed as most dangerous, and he should under no circumstances recommend them, unless he also recommends some system of filtration. As water-supply systems from small streams are usually constructed, the impounding dam in the stream forming the reservoir or pumping basin is simply a catch-basin for all the filth that enters from above. The drainage from such a source of supply catches all the filth deposited on the area drained and carries it to the reservoir. Dead animals are often to be found on such a watershed, where they are allowed to putrefy, and the rains finally carry the débris to the stream. Vegetable matter of every description growing on the watershed finally decays and finds its resting place in the reservoir. Thus the reservoir soon becomes a mass of decayed and decaying filth, and will carry the germs of several cases of typhoid fever to each gallon of water it contains. In summer, when the water gets low or diminished in quantity, such a source of supply becomes most dangerous to health, and under no circumstances is it fit to be used as a water supply.

Precautions Against Contamination

A water supply obtained from a large stream has in the past been considered satisfactory. However, as the country becomes more thickly settled, the sewage from the towns and refuse from manufacturing plants, which discharge their wastes and filth into such streams, are a serious source of contamination; and it becomes a matter of serious doubt whether any running water is fit for a city water supply, unless the water is subjected to an efficient system of filtration.

The water from springs, if of sufficient quantity and within a reasonable distance of the town, can generally be used for a water supply with safety, unless it has become impregnated with mineral matter injurious to health. If a sufficient supply cannot be obtained from springs, it can usually be obtained by boring deep wells. The water obtained from deep wells can be safely classed as good, unless it contains objectionable mineral matter. The consulting engineer will bear in mind that water cannot always be obtained by boring, and that no cut-and-dried rules will apply to the planning of a water-supply system. Each case will present distinctive features of its own, and it will be necessary for the engineer to adapt his plans to the local conditions to be met with in each case.

Consideration of Approximate Cost

After the above information has been obtained and the pipe lines and the location of the same decided upon, it will be required of the engineer to make an estimate on the approximate cost of the proposed water-supply plant. To make the desired estimate, it is necessary that the engineer shall detail the cost of each item of material and labor that will enter into the construction of the proposed waterworks. The engineer must be perfectly familiar with the cost of machinery and material of every description that it will be necessary to use in the construction of the proposed plant.

The consulting engineer is often called upon to give the approximate cost of waterworks before any definite plan is agreed upon or the details of the same are obtained. The engineer must make an estimate of the above kind from his previous experience and the cost of other plants constructed in like towns under similar conditions. The cost of a plant in towns of from 1,500 to 2,500 inhabitants will range, under favorable conditions, from $15,000 to $20,000; in a town of 4,000 inhabitants the cost would be about $25,000; and in a town of 5,000 inhabitants the plant would cost about $30,000. The figures given would apply only to compact and closely built towns in which the water supply was obtained within the corporate limits.

The local conditions may change the foregoing estimates materially, and the consulting engineer will have to make his approximate estimate to meet the local conditions in every case.

FIRE PROTECTION WATER WORKS

Practice in American Cities—Three Kinds of Fire Protection in Use—Description of Methods Employed in Russian City—Good Results of the Separate System

By Nicholas P. Simin

THE first Russian Water Works Convention, which met in Moscow in 1893, having discussed the paper of the writer on "City Water Works for the Direct Extinction of Fires"—Resolved:

(1) The name of "Fire Protection Water Works" should apply to such water works as insure, at any moment of day and night, a constant delivery at fires of a definite quantity of water in the form of streams from fire hydrants, without necessitating the use of portable fire engines.

(2) In the present state of the manufacture of pipes and machinery, the building of city fire protection water works must be considered as entirely possible, desirable and advantageous to the cities.

The use of water works for the direct extinction of fires is very popular in the United States, where water works are so constructed as to be able simultaneously to satisfy the domestic and fire service demands.

In looking over the history of the gradual development of fire protection water works in American cities with separate fire protection water works, it is possible to mark three distinct periods:

(1) The city builds water works, which at the time are able to simultaneously supply all domestic and all fire protection requirements of the city. Such are, at the commencement, the water works of the Holly system, which is adopted in many American cities.

(2) Some years later the domestic demands for water in such cities increase to such an extent as to encroach at times upon the quantities of water required for the extinguishing of fires. If at such a moment a fire occurs, there may not be sufficient water to extinguish it. In order to overcome this important difficulty, rules are enacted, prohibiting the use of lawn sprinklers, etc., during fires, or, as already remarked, steam fire engines are brought into use, by means of which water is drawn from fire hydrants. In both cases the domestic supply is artificially reduced, but this is necessary for successful fire-fighting and therefore is tolerated.

(3) Separate fire protection water works, as in Philadelphia, Detroit, Cleveland, Boston, Buffalo, Milwaukee, and Providence, are built.

It must be admitted, that of these three periods of the development of fire protection water works, the most favorable is that when fire hydrants are capable of giving sufficient fire streams without necessitating the use of steam fire engines. During this period all streets, where fire hydrants are placed, are well protected against fire. During this period the city water supply system is in fact a great fire engine, which, without moving from its place, can give, at any moment of day and night, at any point of the city, the quantity of water necessary for fire fighting.

The two following periods are less advantageous for the fire protection of the city. The fact that separate special water works are built in certain districts of some American cities, shows that the ordinary fire hydrants of the general water works are not sufficient. This defect is removed only for a part of the city, the conditions of other parts remaining without change.

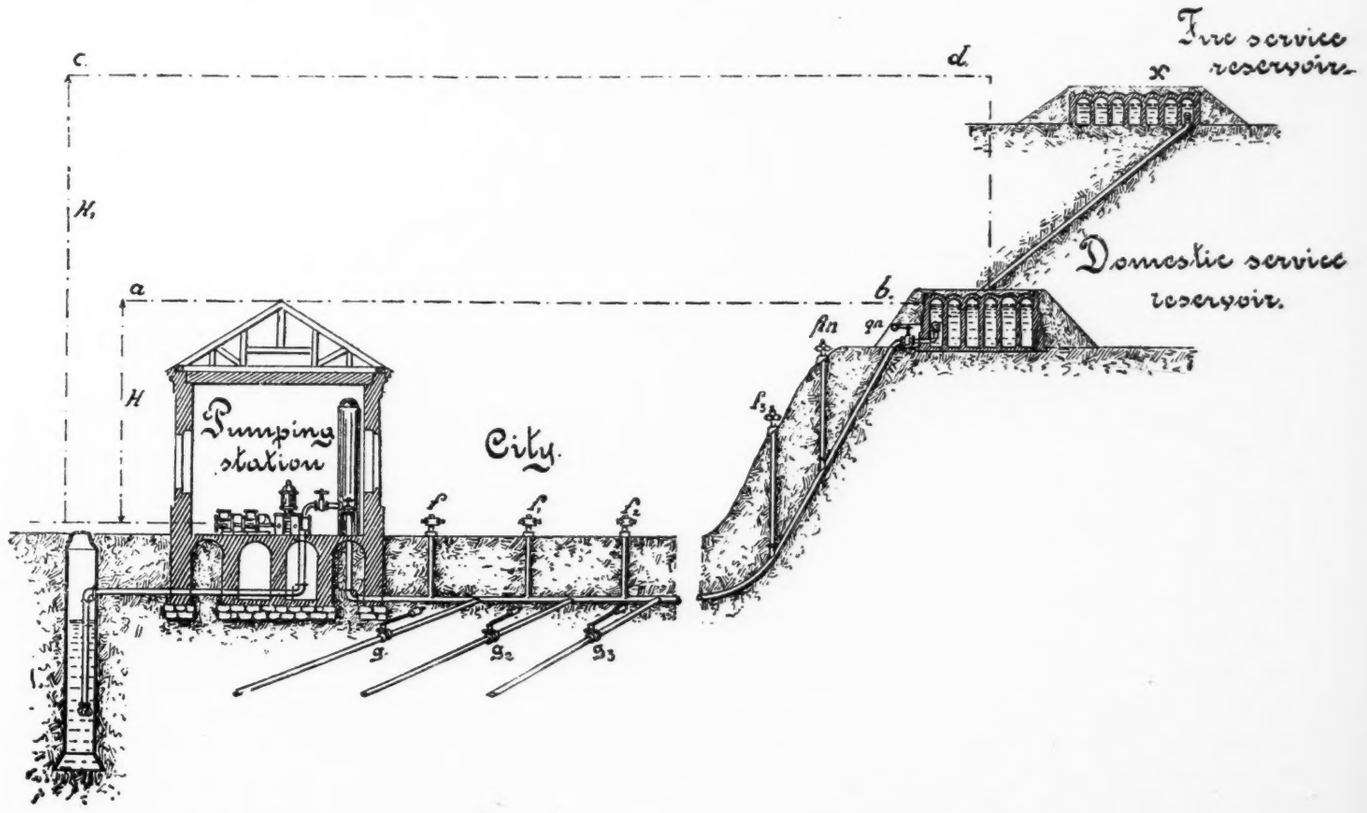


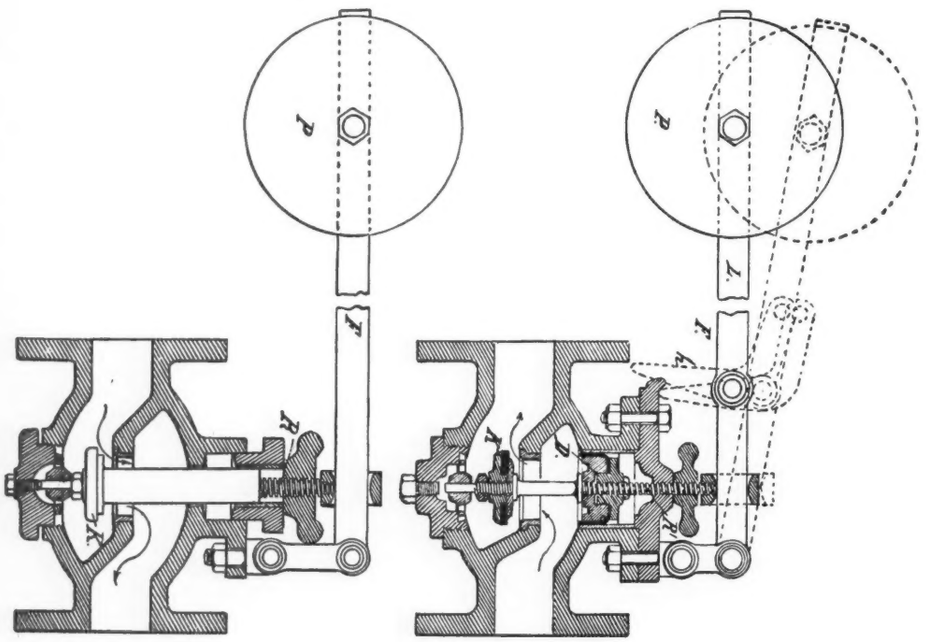
FIGURE I

The transition from direct pressure water works to the use of steam fire engines is a retrogression, because steam fire engines, which have to be transported to the scene of the fire, and which draw water from the city mains, thereby reducing the domestic supply, are not to be compared with strong streams from hydrants, always ready for use. It seems to the writer that it is easier to reconcile oneself to the reduction of the domestic consumption of water while the fire is in progress, the fire extinction being performed by fire hydrants without fire engines, as is the case in those American cities which prohibit the use of water for domestic service during a fire.

The same principle is adopted by the city of Samara on the Volga in Russia, but the system there in use is automatic and original, and will now be described.

The city of Samara, which, in 1886 had a population of 60,000, wishing to have reliable fire protection water works at as small a cost as possible, decided to construct water works with a capacity of 1,000,000 United States gallons per 24 hours, which is equivalent to 90 cubic feet per minute. In order to be able to use this small quantity for fighting fires, the city, following the recommendation of the writer, adopted the following system:

Figure 3 **Figure 2**



AUTOMATIC VALVES

In case of fire, the distribution of water for domestic purposes, fountains, etc., is automatically stopped by means of an increase of pressure in the pipes, and the entire quantity of water yielded by the water supply plant is used, under a higher pressure, to fight the fire.

Such a system makes it possible to use the water mains for fire fighting without a considerable increase in their cost of construction. The quantity of water available for fire protection is constant and well determined, and marked changes in its pressure are not to be apprehended.

The water mains are so calculated that the entire quantity of water pumped can be directed to any point in the district where the pipes are laid, and are provided with a number of fire hydrants. Every domestic branch is provided with a valve which allows a free flow of water in the service pipe so long as the pressure is normal, but which closes automatically and cuts off this flow as soon as the pressure increases.

In the annexed drawings, Fig. 1 shows the application of the system in a plant, Fig. 2 shows a vertical section of such an automatic valve as is used in Samara and Fig. 3 shows a modification of the valve illustrated in Fig. 2.

The valve shown in Fig. 2 is automatically closed when the pressure increases and is automatically opened when the pressure decreases. It is provided with a counter-weight P, acting upon the arm L of the lever F, and heavy enough to overcome the normal pressure of the water in the pipe on the piston D, which is connected by rod R' with the are of the same lever F. This rod also connects the valve K with the piston D. The weight P is so proportioned to the area of piston D as to keep the valve K open under normal pressure; but when the pressure is increased in the pipes it raises the piston D and thus forces valve K to its seat in spite of the pressure of the weight P, thus cutting off the supply for domestic purposes through the branch on which said valve is situated. When the fire is subdued, the pressure of the water is decreased to its normal standard, the valve K opens and the water continues to circulate as before.

In case of fire, increased pressure is obtained by running the pump faster, in which case the plant must be isolated from the reservoir or the mains may be connected with another reservoir X, (Fig. 1) located at such an elevation as to give sufficient head to close the valves, which are balanced under normal pressure, and to throw the water from the hydrants to a sufficient height to fight the fire.

In Fig 1 the height H indicates graphically the normal pressure of water for domestic use, and H^1 the pressure desired in case of fire. g, g^2, g^3 show the domestic pipes, and f, f^1, f^2 show the fire hydrants.

In case of any pipe being broken or if an unexpectedly large number of hydrants should be opened, the pressure might be reduced to its normal standard and thus again allow the delivery of water for domestic purposes. To avoid this an automatic closing device, which does not open again automatically, may be placed on branches for domestic or trade uses, especially on such as have large delivery valves. A simple modification of the valve in Fig. 2 is sufficient for this purpose. Thus, the lever F may be provided with a pawl h, which is automatically caught upon the valves as the lever rises, and keeps the lever in its raised position even when the pressure is diminished. To open the valve it is sufficient to disengage the pawl h from the cover by hand.

Fig. 3 shows another apparatus, the valve of which remains closed even when the pressure decreases, and which must be opened by hand. Under normal pressure the weight P is sufficient to keep the valve open against the pressure of the water upon its under side. When thus open, the valve K rests upon a counter-seat at the bottom of the valve-chamber. When the pressure increases it overcomes the pressure of the weight P, and the valve closes. When thus closed, a larger surface is exposed to the pressure of the water by its being lifted from its counter-seat. If, in this case, the pressure is reduced to the normal, the larger area of the valve acted upon by the diminished pressure is still sufficient to counterpoise the weight P, and the valve remains closed. Instead of the weights P, springs may be used, bearing either upon levers or directly upon the valves.

The water supply plant of Samara has been in use since 1887. The results of its installation have been as follows:

During the ten years preceding the construction of the Samara domestic and fire protection water works (from 1878 to 1887) the average loss caused by each fire in the city was $5,553, and the whole loss, during the ten years, was $1,093,921, the number of fires being 197.

During the fifteen years following the construction of the fire protection water works, from 1887 to 1902, the average loss caused

by each fire in Samara was about $1,000, the whole loss caused by fire in Samara during these 15 years was $538,654. The number of fires in the region protected by the water works, was 539.

The loss caused by each fire in the suburbs of Samara, which have no water works, during six years (from 1887 to 1892) was $6,087. During the same six years the loss caused by each fire in the city, protected by the water works, was $913.

The average annual loss, for ten years before the construction of the water works in Samara, was $109,392; after the construction of the water works it was reduced to $35,910 (less than one-third), in spite of an increase in the population of the city from 56,000, in 1876, to 100,000 in 1901.

During ten years before the construction of the water works the average annual loss caused by fires was equal to $1.58 per person. During fifteen years after the construction of the water works it was reduced to $0.39 per person (less than one-fourth).

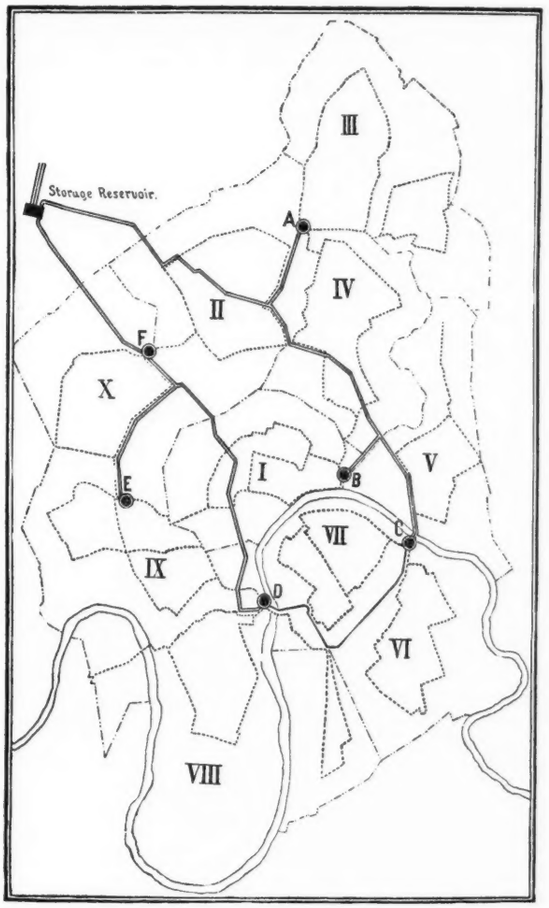


FIGURE 4

When the fire protection water works were built in Samara, the premiums for fire insurance were reduced, saving to the householders more than $50,000 per year.

The building of the Samara fire protection water works plant, and its enlargement during 15 years of its existence, cost the city $296,694; and the total sum saved to the inhabitants of the city by the reduction of the fire insurance premiums following the construction of fire protection water works, during the same 15 years, was $1,950,000.

The water works brought also considerable profit to the fire insurance companies, notwithstanding the fact that the lowering of the insurance premiums in Samara was more than sufficient to cover the water works bond with interest. This is shown by the following figures:

In 1885 fourteen fire insurance companies received from Samara (for the insured sum of $7,182,300) premiums amounting to $69,883. In the year following the erection of the water works, that is, in 1888, the insured sum grew to $7,827,950, but the total sum of premiums was reduced to $47,851, saving $22,032 as compared with 1885.

In 1889 the sum insured by fourteen fire insurance companies reached $16,649,650, but the sum of the premiums was only $55,035, or $14,848 less than the premiums received by the same companies in 1885, when the insured sum was $9,467,350 less.

The total sum of the premiums received by the fourteen fire insurance companies, from 1887 to the end of 1889, was $611,952; the payments made by the fire insurance companies, for losses caused by fire, were $226,470; leaving, as the gross profit of the fire insurance companies, $385,482.

Before the fire protection water works were built the city of Samara was often laid waste by fire; after the building of the works there were no cases where the fire spread from one house to another.

Such were the results obtained during fifteen years from water works yielding as little as three to four streams of water, these streams being constant during the whole period of the fire.

The average duration of each fire in Samara does not now exceed thirty minutes, so that the automatic stoppage of the delivery of water for domestic use causes but little inconvenience.

The same domestic and fire protection system was used, under instructions of the Russian Government, for the protection of the Russian Industrial and Art Exposition in Nigny Novgorod in 1896.

In 1901 the writer built, also according to the same system, the first water works of Siberia, in the city of Tobolsk.

The automatically closing valves of the water works of Tobolsk are placed, not outside of the houses, as in Samara, but inside the houses. As soon as a fire breaks out, the valves close; but in case of great necessity it is possible to open each of them by hand. The fact of the valve closing itself automatically serves as a sign that water is needed for fire purposes, and that it should be used as little as possible. Water works in Tobolsk have been in use since December, 1901, and have already shown their fire-fighting capacity.

Returning to the general subject of fire protection water works, the writer desires to express the opinion that it is not desirable to give up the direct use of fire hydrants without steam fire engines. It is not desirable to use fire engines, which encumber and complicate the work of the firemen.

In cities where the discharge of fire hydrants is reduced, it can be easily restored during the fires by the method adopted in Samara, which allows the use of the domestic supply for the extinction of fires without reducing the flow from the fire hydrants, but, on the contrary, increasing that flow so that fire engines are not required.

The writer understands, however, that such a system presents considerable difficulties for large cities, because it requires the quantity of water necessary for the whole city to be pumped under increased pressure; and, in the case of the Russian automatic system, the domestic supply of the whole city would be stopped. These difficulties may be avoided by dividing the city into several districts, each having a separate pumping plant and a separate system of mains. Water can be supplied to all these pumping plants by a common low-pressure water conduit. The separate pumping plants can take water from the common water works conduit and pump it into the separate district systems at any given moment in the quantity and under the pressure at that time necessary. With such a divided system, the pressure, in case of fire, will be increased only in one district of the city, all the others continuing to be supplied as before. In such a way the inconvenience of stopping the domestic supply during fires is reduced to a minimum. The automatic system may, if desired, be applied to one or more of the districts without affecting the entire city.

As an example of such a system, the writer can point to his project for the water supply of Moscow, which, however, has not been executed. It is shown on the accompanying plan, Fig. 4. Such a system places a large city in the same advantageous position in regard to fire fighting, with many small cities in the United States which are using the Holly direct pressure system, a system, however, which is really useful only so long as the domestic demands of water do not unduly reduce the discharge of the fire hydrants, thereby necessitating the introduction of steam fire engines.

GUARANTEEING PUBLIC WORKS*†

The Practice Open to Question—General Theory—Effects and Value Depend Upon Surety—Should Be for Quantity of Service Rather Than Stated Time

By S. Whinery

The practice of embracing in contracts for municipal work, particularly those for street-paving, a provision that the contractor shall guarantee the work done by him for a number of years, has become very common, and the tendency to require these guaranties seems to be growing. Whether such guaranties are, on the whole, beneficial to the interests of the municipality or not, is a question that admits of argument on both sides. At first thought it would appear that the municipality has everything to gain and nothing to lose; but the question has not been pursued to its ultimate consequences, and the whole problem has not been worked out with the care its importance deserves. If it be granted that it is proper and wise to require and enforce a guaranty, it must be admitted that the language of the contract in which the conditions of the guaranty are expressed, is often so loose and indefinite on the one hand, or so sweeping and so obviously unjust on the other hand, as to make its application to actual conditions difficult if not impracticable. A brief consideration of the whole subject may therefore be of interest.

We need not include in the discussion those short-period guaranties, required by many cities, to the effect that any defective work appearing within a brief period, usually six months, must be made good at the expense of the contractor, nor those which require that machinery furnished shall accomplish stipulated results. Such guaranties are reasonable and proper, and there can be no valid objection to them.

The general theory upon which the contractor is required to guarantee the work done by him for a period of years is, that under such a requirement the responsibility for the good and sufficient quality of the work done and the materials used, is largely shifted from the city to the contractor, since his self-interest must compel him to perform his work in the best possible manner, in order that it may endure through the period guaranteed, and be accepted by the municipality at the expiration of the period. It is argued that under such a requirement the contractor cannot afford to slight his work, because the consequences will eventually fall on him, and he and not the municipality will suffer for any carelessness or bad work that he may allow.

Without at present questioning the soundness of this general theory, let us examine its practical workings and endeavor to determine whether or not the municipality receives in the end any substantial benefit therefrom.

In the first place, it must be recognized that the value of such a guaranty will depend upon the ability of the municipality to enforce compliance with its terms. To insure such compliance, two methods are in common use. One of these is to withhold from the contractor a part of the money that would otherwise be due him on the completion and acceptance of the work, until the guaranty has expired. This method will prove effective if the sum retained is large enough to constitute a sufficient surety. In practice, in contracts for street-paving, the amount retained is usually some per centum of the whole cost of the work. In contracts requiring a guaranty for five years, the usual amount retained is ten per cent. of the value of the contract.

The other method referred to is to require the contractor to give bond in a sufficient sum to cover all possible liability. As such a bond must run for a period of years, personal sureties cannot be safely relied upon, since an individual who is wealthy to-day may be a pauper before the end of five years; and the only reliable surety must be that furnished by responsible surety companies. These companies are naturally averse to underwriting bonds, even for contractors financially strong, extending over long periods of time and involving many uncertainties; and if they do so, they charge high rates for the service, which must be paid by the contractor. He must, therefore, necessarily charge such prices for his work as will yield a sufficient sum above reasonable profit to meet these charges.

It has been claimed that contractors add little, if anything, because of the guaranty requirement, to the prices they would otherwise name; but the claim is untrue in fact. That the maintenance of the guaranty always costs something, and that in many cases the cost amounts to a large percentage of the contract price, is proved by the experience of every contractor, and must be obvious to any one.

There is another feature of guaranties that must be considered. If a contractor is required to maintain a pavement for a period of years, care must be taken by the municipality to do nothing itself, and to prevent others from doing anything, that will relieve the contractor from his obligation. For instance, the municipality may not itself, nor may it permit others, to remove and then repair parts of a guaranteed pavement for the purpose of constructing railroads, sewers, or other underground structures, since not only may the contractor assert, and often truly, that the adjoining pavement was injured in the operation, but he may claim that defects appearing in the future may be within that part of the street disturbed and repaired by parties other than himself, and for which, therefore, he cannot be held responsible; and it is generally difficult, if not impossible, to locate accurately, after a lapse of a year or two, the repairs made by those other parties. It is therefore found advisable to couple with the guaranty requirement a privision that the guarantor shall make all required replacements at a stipulated price. This price may be fair and reasonable at the time it is made, but during the life of the guaranty prices may greatly decline, so that the contractor may receive exorbitant compensation for all the repair work to be done. It is well known that, owing to the great decline in prices of asphalt pavement during the past few years, many cities are paying, and must continue to pay for many years to come, under existing guaranty contracts, very much higher prices for repairs than those prevailing at the present time. It is true that repairs of this character are usually paid for by the private persons for whose benefit they are made, and not by the municipality, but the loss falls on citizens whose interests it is the duty of the municipality to protect as far as practicable. It is true also that the movement of prices might be in the opposite direction, in which case the guarantor would have to shoulder the loss, and the municipality or its citizens would reap the benefit; but this does not invalidate the conclusion it is desired to present, that it is not wise to make contracts extending over a long period of time for services or supplies the market price of which is liable to fluctuate within wide limits.

In view of all the facts, it may, therefore, well be questioned whether, in the end, the municipality is not the loser rather than the gainer through the operation of guaranties on public work. Whatever may be the answer to this question, it is worth while to inquire if the end aimed at cannot be attained by some other means less objectionable to all parties concerned.

The question of the legality of long-time guaranties has been often raised and deserves careful consideration. Where public work, and

* This article is a digest of a chapter on the above named subject taken from a book—"Municipal Public Works"—written by S. Whinery, C. E., of New York. It is here published by courtesy of The Macmillan Company of New York. The book deals with other subjects of equal importance to municipal officials and is full of valuable suggestions. The author deals with the practical and fundamental methods of administration, which are all the more valuable for being based upon the experience of a thorough engineer. It is a work which should be in the hands of every mayor, city official, and, in fact, the executive head of every municipal department. It retails at $1.50 net, exclusive of postage, and can be secured by addressing the publishers or the Municipal Journal and Engineer.—[Editor.

particularly street-paving, is paid for partly or wholly by special assessments, the laws almost invariably provide that the cost of construction alone may be assessed upon the property owners benefited, and it is either expressly or by implication provided that the cost of maintaining the work, after it is constructed, shall be met from the general funds. It is, therefore, necessary to distinguish between repairs that may become necessary because of faulty materials or workmanship, and those which will inevitably become necessary, because of the wear and tear of use, however well the work of construction may have been done. This latter class of repairs may properly be called *maintenance*. But the guaranty clauses in use in most cities are so drawn as to compel the guarantor to maintain the work in good condition during the period of the guaranty, regardless of whether it was properly constructed or not; and it cannot be doubted that the contractor, in framing his bid for the work, adds to the price of construction a certain sum to cover the cost of such maintenance. In other words, the bid is made up of a certain sum for construction and a certain other sum for the maintenance required by the guaranty. The property owner who may willingly consent to be assessed for the construction of the improvement, may object to having the cost of maintenance specially assessed upon his property. A number of cases involving this question have been brought before the courts, and a large majority of the decisions have been to the effect that contracts containing guaranties which involve maintenance of the completed work, are null and void. The decisions to the contray effect are based upon the argument that the terms of the guaranty do not necessarily require the maintenance of the work, in the proper sense of that word; but only that the guarantor shall do the work in such a manner that maintenance will not become necessary within the time stipulated; and if it shall become necessary to expend money for repairs, the fact is to be regarded as evidence that the contractor did not perform the work in the manner required, and must, therefore, make good the consequences of his failure. While this reasoning may possibly be accepted as satisfactory in theory, every man of practical experience knows that it is not justified in fact, since almost no street pavement subjected to even moderately heavy travel will endure for a period of five years, much less for a longer period, without expenditures for repairs that are clearly chargeable to maintenance, and which no fair-minded person could attribute to defective construction. This is tacitly admitted in many guaranty contracts by the use of the phrase "ordinary wear and tear excepted," but this limitation increases rather than diminishes the difficulty. Who is to decide, who *can* decide, whether repairs made are due to original defects in material and workmanship or to ordinary wear and tear?

The fact is not overlooked that it may be proper and legally permissible to require a guaranty that a street pavement shall endure a certain amount of service and shall retain a capacity for further service; but unless the required service be clearly defined in unmistakable terms, who can say when the conditions have been met? A contract for a dozen eggs is definite, but one for a basket of eggs is not. So a contract requiring that a pavement must be capable of carrying so many tons of travel would be definite; but one that requires that it shall carry all the travel that may come upon it for a certain period of years, regardless of the fact that, even if the present quantity of travel be known, no idea can be formed of what it may become during that period, is neither definite or just. There must be some fairly definite quantity of travel that the pavement may be reasonably expected and guaranteed to carry without deterioration. Any additional quantity will make repairs necessary that cannot be said to be due to any want of integrity in the work. Such repairs are clearly chargeable to maintenance; and if the provisions of the law are to be complied with, their cost must not be specially assessed against the property owners. How shall the proper division be made?

Take another view of the matter. The guaranty clause, as usually framed and used, is made to apply uniformly to all—or at least to many streets of the same city. But it must be obvious that on some of these streets, while the actual cost of constructing the pavement will be the same, the cost of maintaining (*i. e.,* guaranteeing them) will be much greater than on others, and the contractor would make a corresponding difference in the prices he would bid. To illustrate: Two parallel streets of equal width are to be paved, and contracts for the work are entered into, requiring that the contractor shall guarantee the pavements for, say, five years. The contractor proceeds to execute the work, using exactly the same materials, employing the same skill, and exercising the same care in the case of each, so that when the work is completed, the pavements are identical in all essential respects. They should, therefore, be capable of enduring the same service under similar conditions. But one of the streets is, and will continue to be, subjected to three times as much travel as the other, and that travel is of a much more destructive character. It is inevitable that the effects of wear and tear upon the one will be at least three times as great as upon the other. It may be that the quantity of wear and tear upon the lighter-traveled street will be such that the pavement will just endure to the end of the guaranty period without repairs, and be in acceptable condition at its expiration. If so, the pavement on the other street, having performed three times as much service, will have required extensive repairs, and will need to be virtually reconstructed before its condition will conform to the guaranty requirements. If the contractor was aware of all the facts when he submitted proposals to pave the two streets, and if he based his prices upon what the work would finally cost him, he doubtless bid a much lower price for the one than for the other. Why did he do so? Was it not clearly because he had reason to believe that on the one pavement he might expect that after the construction was completed he would be at the expense only of remedying such defects as may always be found to have crept into the work, while upon the other he must expect to expend a large sum of money for repairs made necessary by the wear of the heavy travel? And, if so, is it not evident that the difference in price is fairly chargeable to the maintenance of the pavement on the heavier-traveled street? It is almost certain that the property owner on that street would take that view of the matter and might appeal to the courts for redress. No such case has, I believe, been passed upon by the courts, but it is difficult to conceive how, on the facts presented, they could fail to support the view of the complaining property owner.

Where guaranties extending over a period of years are required, it is important that the guaranty clauses of the contract should be more carefully drawn than has been customary in most cases in the past. While they should clearly and explicitly define what the contractor is expected to do, it is advisable to omit impracticable and unreasonable requirements which the municipality may not be able to enforce, and to avoid, as much as possible, the contingency of legal complications. The decisions of the courts indicate that where work is paid for from special assessments, a clear distinction must be drawn between repairs made necessary by the use of improper materials and workmanship, and those that may be properly classed as maintenance of the work. Such a distinction is not easy to define precisely, and its practical application is a matter of very great difficulty. In the case of a street pavement, for instance, repairs may become necessary from any one of the following causes:

1. The failure of the contractor to do the work properly and skilfully with suitable material and workmanship.

2. The cutting out of the pavement for the construction and repair of other structures.

3. The accidental or malicious destruction of or injury to the pavement.

4. The wear and destruction of the pavement by use, which will occur to a greater or less extent, however well the work may originally have been done.

In the first case there can be no question about the duty of the contractor to make all necessary repairs under his guaranty. In the second, it is universally admitted that the repairs should not be covered by the guaranty, and that the contractor is entitled to compensation therefor. In the third case, it is not only unwise but unjust to require a contractor to make repairs caused by accidental or malicious injuries to a pavement. While most cities seek to avoid including such repairs in guaranty contracts, there are not a few where the language of the guaranty still includes them, and where it is seriously insisted that the contractor shall make good

injuries of this character. Neither the corporation nor the contractor can foresee or provide against such accidental injuries to the work, and the contractor has no police power to prevent the destruction of the work by its improper use, whether the result of malice or carelessness. Among accidental causes of injury may be named the breaking of water mains, the collapse of sewers, great fires along the street, etc. Protection against losses of this character is the function of insurance companies rather than that of contractors.

Among other causes of failure of pavements may be named the settling of trenches made by other persons under the direction of the municipality, but over the refilling of which the paving contractor had no control; the hauling of excessive and unlawful loads over the street; and, in the case of asphalt pavements, the escape of gas from the mains, and the building of bonfires on the street. The municipality alone has the power to prevent these things, and should, therefore, bear the responsibility for them; and while the contractor may, for various reasons, consent to make such repairs under his guaranty, there can be little doubt that if he chose to contest the question, the courts would sustain him.

It seems clear, therefore, that the only repairs which the contractor for constructing a pavement may be fairly required to make, under a guaranty, are those which may result from failure on his part to use suitable materials, and to do the work in a skilful and proper manner, in accordance with the provisions of the contract, or from the failure of the pavement to endure a stipulated amount of use. If it were possible clearly to distinguish repairs made necessary by defective materials and workmanship from all others, and to define and measure the amount of use expected of a pavement, it would be a comparatively simple matter properly to frame the guaranty provisions of the contract; but, unfortunately, it is difficult, if not practically impossible, to do so. This is well recognized, and both municipality and contractor understand that the guaranty requires that the pavement is to be maintained in good condition during the whole period, even if the repairs required are clearly due to travel, and not to defective material or unskilful work.

It is doubtful, however, whether it is either necessary or advisable, or even desirable, to introduce an endurance requirement in guaranties of pavement work. We know with fair approximation the relative lasting qualities of the several kinds of standard pavement, and it is practicable to frame specifications for their construction which, if carried out, will insure work of reasonable uniformity; and the agents of the municipality have the necessary practical knowledge to enable them to enforce such specifications. With, then, a time guaranty covering a sufficiently long period to disclose defects of construction that may have been overlooked, we might confidently expect very satisfactory results.

But if it shall still be desired to make the contractor responsible for the care of his work over a longer period, this may be accomplished by having him name in his bid a price per square yard per year at which he will keep the pavement in repair for the desired number of years after the expiration of the two years of free guaranty. If there should exist any question of illegality, the cost of such repairs repairs could then be paid out of the general fund, the cost of construction only being specially assessed against the property owners. Payment for the repairs would be made annually or quarterly, as the repair work should be done. This would be more equitable than the present practice, where the cost of maintenance being included in the construction price, the contractor receives the whole amount when the construction is completed.

A SAN FRANCISCO PARK VIEW

This is a photograph of the Palm Avenue on Sutro Heights. It shows better than any mere description the opportunities offered by the climate of San Francisco for the decoration of public places and the beautifying of the city as a whole. Private enterprise has here attained most pleasing effects by means of some statuary and the sort of semi-tropical vegetation that thrives out doors in the perpetual summer of California. The fact that the people of San Francisco enjoy that sort of thing is sufficiently evident from the frequency with which they resort to such scenes wherever they have been made accessible to the public. A city with a mild and equable climate, plenty of sunshine and almost continual exemption from killing frosts lends itself with peculiar facility to such adornment, impossible in most Eastern States. The time should not be far away when similar vistas of beauty can be found in the heart of the city, and when it will not be necessary to make an excursion to find them. If the San Francisco public desired it, it would not be difficult to make a great many of its principal thoroughfares as beautiful as the Palm Avenue.

A SAN FRANCISCO PARK SCENE

LEAGUE OF AMERICAN MUNICIPALITIES

Preliminary Programme—Questions of Vital Importance Will Be Discussed—Convention to Be Held at Baltimore, October 7, 8 and 9

*By John MacVicar**

THE League of American Municipalities, after an existence of six years, has upon its membership roll most of the important municipalities of the United States and Canada. Its sphere of usefulness has constantly broadened, until it has become a recognized center of municipal information throughout the United States and Canada. Its annual conventions bring together the brightest minds engaged in municipal work. The publications issued by it contain a fund of practical information of immense value to the student of municipal government. The matter emanating from the Bureau of Municipal Information, consisting of facts gathered from authentic sources, serve as a valuable guide to the municipal official. Pet theories of individuals are discarded, and the matter at hand is given without prejudice.

The League, by co-operation, does for its members, at a nominal cost, what Chicago is doing for herself at a large expenditure, what New York undertook to do, but is said to have abandoned because of the difficulties in the way, and what Boston asks an appropriation of $50,000 annually for doing, viz., provides a department of municipal statistics and comparative information available to each official of every membership city. The most conscientious official cannot but feel justified in appropriating for the purpose of receiving information for the municipal officials the small sum annually necessary to cover the League dues, which not only puts the Bureau of Information at the disposal of each of the city officials, but also covers the annual subscription for each official to the League bulletins and convention proceedings.

The preliminary programme is as follows:

"The Advantages of Municipal Construction Over the Contract System" will be presented by Hon. James M. Head, Mayor of Nashville, Tenn. Mr. Head, since his advent as Mayor of Nashville, has accomplished wonders for that municipality. He has settled the gas controversy upon an extremely favorable basis, the rates being fixed at $1.00 per thousand feet, five per cent. of the gross receipts being paid to the city. The complicated street railway controversy has, by his efforts, resulted in a settlement fully protecting the city's interests. Largely by his efforts, also, a municipal light plant has been installed, which has resulted in a material reduction in the price for electric light to private consumers, as well as a large saving in the cost of street lighting.

Hon. James A. Reed, Mayor of Kansas City, Mo., will discuss the general question of "Municipal Ownership of Public Utilities." Mayor Reed is a vigorous speaker, and is fully competent to present this subject in a manner that will be extremely interesting. Largely through his efforts, the Metropolitan Street Railway Company of Kansas City has recently made liberal concessions to the city, paying eight per cent. of its gross receipts in lieu of all other taxes. Kansas City has also recently secured a favorable rate for electric street lights. Under the terms of the settlement, hereafter, two thousand candle-power electric lamps, burning all and every night, will cost $65.00 per annum. The price previously paid was $110.00.

Hon. John Arbuthnot, Mayor of Winnipeg, Canada, will give a description of "The Operation of a Municipal Asphalt Plant," which was installed in his city largely through his efforts. Several municipalities in the United States repair asphalt paving independent of the contractor, and many municipalities are seriously contemplating the question of doing all such work directly by the municipality.

The discussion of "The Initiative and Referendum" will be led by Mr. George Shibley, Chairman, National Federation for Majority Rule, Washington, D. C. The question of the referendum has come to be considered more than a mere theoretical reform. Its practical operation in San Francisco and Seattle, and its direct connection with the recent measure passed by the Illinois Legislature, providing for municipal ownership of Chicago's street railways, makes it a question of more than ordinary interest. Mr. Shibley has studied this question from the practical standpoint.

"The Labor Mayor" of Hartford, Conn., Hon. Ignatius A. Sullivan, will lead in the discussion of the question, "Organized Labor and the Municipality." The election of Mayor Sullivan a little more than a year ago on an independent ticket, by the members of the union labor organizations of Hartford, attracted considerable attention. Mr. Sullivan is a bright speaker, and will handle this very pertinent question in an intelligent and interesting way.

Prof. Edward W. Bemis, who is so favorably known to the members of the League, has consented to present a paper on "Water Waste." Prof. Bemis is a recognized authority on all matters pertaining to the conduct of public utility plants, but since he has filled the important position of Superintendent of Water Works in Cleveland, O., for the past two years, under the administration of Mayor Tom L. Johnson, he will be enabled to give the experience of the practical man as well as the theorist.

There is no monopoly more objectionable to American municipalities than the Bell Telephone Company. While the formation of independent companies throughout the country has accomplished much to mitigate the evil, there is a growing belief that it will not be wholly overcome without the co-operation of all municipalities. For this reason the subject assigned to Mr. J. F. Hemenway, Secretary and Treasurer of the Ericsson Telephone Company—"Municipal Telephone Exchanges"—will be of more than usual interest to the members of the League. Mr. Hemenway is well posted upon the subject and will give facts relative to municipal ownership of telephones in Europe and Great Britain and the progress in this direction in America.

The important question of "Paving" will be taken up by Prof. A. W. Dow, who is Inspector of Asphalt and Cements for the District of Columbia. Prof. Dow is a well-known authority in this branch of municipal construction and will handle his subject in a practical manner, endeavoring to show how cities may obtain good pavements at a reasonable price, at the same time calling attention to the negligence of the majority of municipalities in this branch of municipal engineering.

"Municipal Statistics" will be discussed by Mr. Hugo S. Grosser, who is librarian and statistician for the city of Chicago.

While the question of municipal ownership has received general attention in the League meetings, it is the expressed policy of the League to refrain from taking sides for or against the proposition generally. An effort will be made to have the opposition to municipal ownership represented upon the programme. To this end, Mr. Ernest H. Davis, of Williamsport, Pa., newly elected secretary of the National Electric Light Association, has been invited to take a place upon the programme, and it is probable he will accept the invitation, discussing municipal ownership of lighting plants from the standpoint of the private companies.

A number of other speakers will be on the programme, discussing the subjects already named, and also covering other subjects.

Baltimore was selected as the place to hold the seventh annual convention of the League through the efforts of Ex-Mayor Hayes. Robert M. McLane, the newly elected Mayor, has given assurances to the executive committee of the League that he will interest himself in every way possible to make the convention a success from every standpoint.

* Secretary of the League of American Municipalities, with headquarters at Des Moines, Iowa. For further information, printed matter, etc., address the Secretary at the League's headquarters.—[EDITOR.

BITULITHIC PAVEMENT IN NASHVILLE

Discussed by Southern Engineers—Principles of Its Construction Elaborated and Commended—Points of Excellence Shown by Use in Nashville and Elsewhere

By W. W. Southgate *

VERY few street pavements surpass in excellence the good qualities of a well-constructed, thoroughly-rolled macadam roadway when new and recently from under the steam roller. Of course, a macadam surface has its defects; probably the most serious fault is the cost of maintenance; but the good qualities decidely outweigh the defects. It will sustain great loads; by reason of the excellent foothold afforded, it is easy of traction; and it is quiet, smooth, and elastic.

EARLY METHODS OF ROAD BUILDING

A long period of time elapsed from the Roman road builders down to the time of John Macadam, in the early part of the last century, before any one had creative faculty sufficient to discover the value of wedging and binding broken particles of stone together into an even and compact mass for a roadway; and when this result was accomplished, what an immense improvement it proved to be in point of smoothness and comfort over the old, rough stone-block and cobble roads! Strange as it may seem, almost a century has passed from the invention of John Macadam up to the present time before an effective method has been devised for completely overcoming the defects of a macadam wearing surface. Telford greatly improved the stability of the macadam surface by his method of constructing a foundation of larger stones, cracked down with hammers in a layer to sustain the macadam; and considerable improvement has been made from time to time by ingrafting smaller particles of stone into the macadam to bind the particles of stone together. Still, the macadam surface had many serious faults. Water would percolate down through the stone, soften it, and weaken the foundation; freezes and thaws would disintegrate it; it would ravel out; and rains washed it away. Mud is an intolerable nuisance in wet weather; dust is as great nuisance in dry, windy weather.

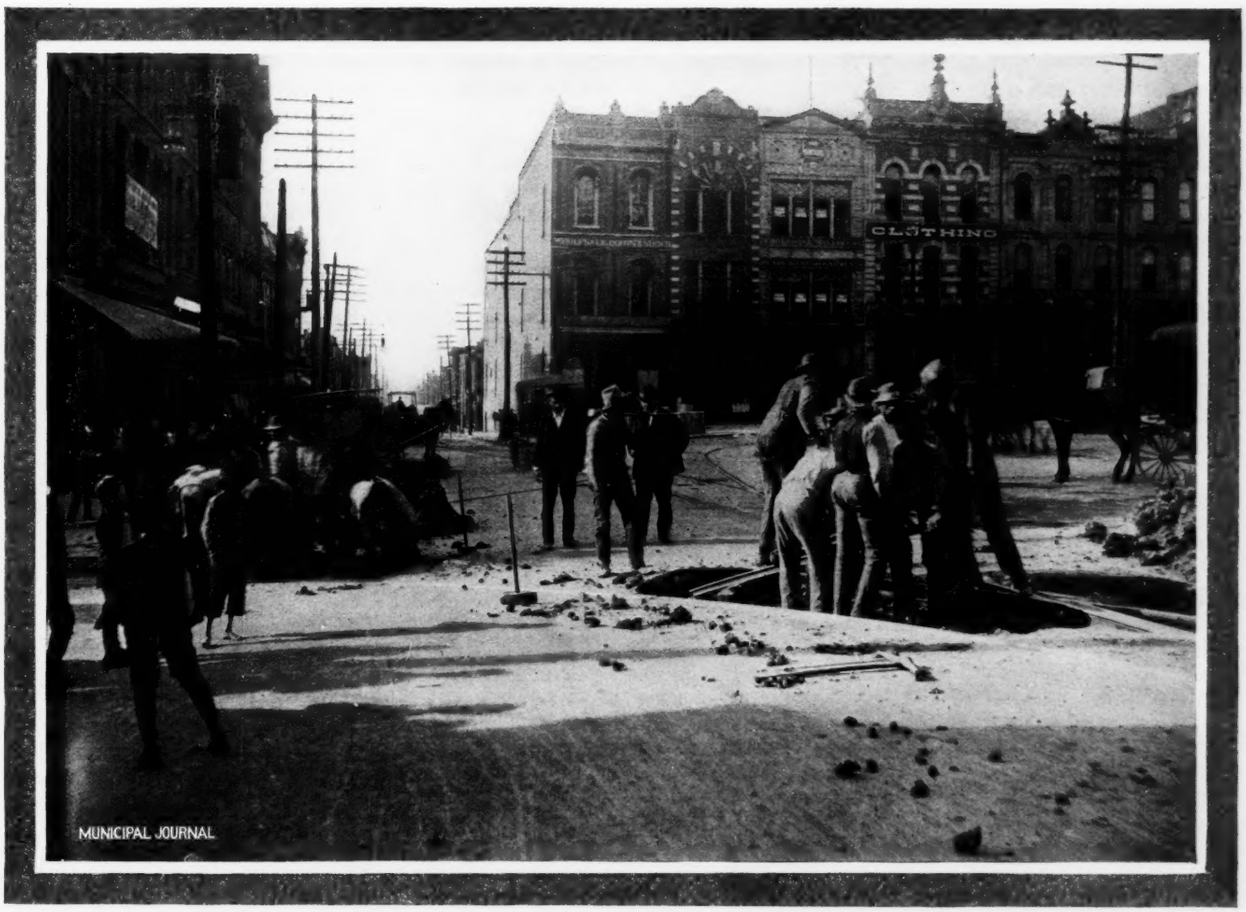
BITULITHIC PAVEMENT, NASHVILLE, TENN., LAID, 1902

DEFECTS ELIMINATED BY MODERN METHODS

Very recently all these numerous defects seem to be completely cured and eliminated by the invention or method of construction employed by the Warren Brothers in the production of their bitulithic, or bituminous macadam pavement. The solid ingredients of this pavement are, in the main, identical with those of an ordinary macadam surface; but scientific methods are employed and skill and intelligence are exercised to so graduate the particles of stone that the least possible number of voids will be left in the mass, and thus the larger particles are sustained and keyed in place by the

* City Engineer of Nashville and member of the Engineering Association of the South, to which this paper was presented for discussion on May 14, 1903.

smaller particles in such a manner as to form a stable and compact mass, even if no cementing material were used. The bituminous cement is employed to coat every solid particle, from the coarsest to the finest; to fill every void between the solid particles; and to cement and bind all together into a very dense and absolutely waterproof mass. By this means the long-sought desideratum for the preservation of the macadam wearing surface against the destructive action of water and weather is accomplished, and, incidentally, the mud and dust accompaniments of an ordinary macadam roadway are eliminated. Dirt and dust, of course, will accumulate from droppings and from mud brought onto the street upon the wheels of vehicles from other streets, unless the surface is swept clean from time to time, just as dirt will accumulate on a brick, granite, or asphalt surface from similar causes; but the wear of the bituminous surface is so insignificant that dust is not developed from the wearing away of the surface.



STREET RAILWAY FORCE TEARING UP BITULITHIC PAVEMENT, NASHVILLE

How the Foundation Is Prepared

The foundation for the pavement is prepared by solidly rolling down a layer of stone from 4 to 6 inches in thickness, composed of clean broken stone that will pass through a ring of 2½ inches. After the foundation has been sufficiently compacted by the steam roller, the sub-base is lightly sprinkled with a heavy oil or very thin bituminous mixture that causes the next coating of bituminous cement to spread over and to completely envelop and hermetically seal every exposed stone in the foundation. The latter coating is composed of a soft bituminous cement that is copiously applied to the foundation while hot by means of sprinklers. Thus prepared, the foundation is rendered waterproof and is ready to receive the wearing surface. The wearing surface is composed of the best grade of clean hard stone that will pass through a ring of 1¼ inches and of finer particles, graduated in such proportions, down to the finest dust, that not more than 10 per cent. of the voids will remain in the mass. The solid particles are run through a rotary drum drier and heated to a temperature of about 200 degrees Fahrenheit. From the drier the particles are elevated and run through a rotary screen that separates them into various sizes, each particular size dropping into a receptacle to itself. From the bins the particles gravitate into a hopper mounted on scales so adjusted that the predetermined weight of each particular sized ingredient is measured out automatically and with absolute precision. By this arrangement every hopperful of solid particles is made up of the various sized ingredients in accurate proportions and so graduated as to result in the smaller number of voids. From this hopper the charge of solid ingredients is dumped into a twin pug mixer, the particles are thoroughly stirred together, and the requisite number of pounds of hot bituminous cement is poured into the pug mixer from a receptacle suspended upon a scale beam that weighs out the exact bituminous cement required for each charge of the mixer. In about two minutes each charge in the stem-power-driven mixer has become so thoroughly mixed that every solid particle, from the coarsest to the finest, is entirely coated with the bitumen, and enough surplus bitumen is ingrafted into the mixture to fill every void and to act as a rubbery cushion between the particles and at the same time serve to bind all particles together into one homogeneous mass. From the mixer the mass drops by gravity into carts placed beneath the pug mill, and, while the mixture is still hot, it is carted to the street and spread in a layer that forms a wearing surface about 2 or 2½ inches in thickness after being properly compacted by a 15-ton or 20-ton steam roller.

The Wearing Surface

After the bituminous mixture has been continuously rolled and thoroughly compacted, the surface has a pitted, or honey-combed appearance, which is due to small cavities between the particles of stone. The body of the mass, however, upon being broken and

closely examined, is found to be very dense, with no appearance of voids. In order to completely fill all these small pitted, or honeycombed, cavities in the surface, the pavement, while still warm, is gone over with a very hot, quick-drying bituminous cement and thoroughly rubbed, or squeegeed, into the surface, in order to seal or completely heal up all such cavities, partly to preserve the surface from attack, and to make a perfect wearing surface. A coating of fine stone chips is then spread over the surface, while the squeegeed coating is still hot, and is thoroughly ingrafted into the wearing surface by rolling. This last operation completes the pavement, and by it a tremendous pressure is brought to bear which compresses all the particles together into the densest mass possible.

This pavement is a novel and scientific combination of old and well-tried materials that have proven their value for paving purposes by the test of time, and by the means of this novel combination the problem of constructing a perfect and a durable macadam pavement seems to be effectively solved. By the combination of the larger and smaller particles of stone in exact proportions a mixture is attained which closely approaches the density of solid stone, and great rigidity is attained for the mass. The bituminous cement completely fills all interstices between the solid particles and produces a perfect concrete, in which the bitumen takes the place of hydraulic cement as a binding material and renders the mass perfectly homogeneous and absolutely waterproof. The result of this combination is a pavement that is elastic and noiseless, that is easy on animals by reason of its elastic nature, and that is easy of traction by reason of the excellent foothold afforded by its gritty surface. It can readily be cleaned either by sweeping or by flushing. Being waterproof, it cannot be washed away by rains; and frosts cannot disintegrate the stones.

Satisfactorily Used in Nashville

The pavement has given satisfaction in Nashville, where it has been subjected to severe test by heavy traffic. It has gone through the heat of one summer; and while it becomes plastic under a hot sun and shows the markings of horseshoes and of wheels for a short time, all such marking are ironed out by succeeding traffic. It has never become soft enough to become sticky or in the least unstable, but has rather taken the nature of a rubbery cushion. The coldest temperature of winter did not harden the surface sufficiently to make it brittle. The pavement has gone through the winter without the least sign of cracking.

The solid particles of the pavement are so keyed and interlocked and the wearing surface is so dovetailed into the foundation that there is no danger of the pavement's creeping or crawling on steep grades, as is frequently the case with an asphalt surface.

That this pavement is a very dense, compact, and exceedingly tenacious paving material was revealed when the street railway workmen were required to remove some of the pavement recently in changing the gauge of the car tracks. Extraordinary means had to be resorted to, to take up the wearing surface. Ordinary pick-axes in the hands of stout laborers had scarcely any effect and were useless. Heavy steel cleavers, such as are used in cuting steel rails, driven by 20-pound and 30-pound sledge hammers, were required to make an incision into the wearing surface; and heavy crowbars, made of old car rails, were required to tear the surface up after it was cut into.

Given a hard, durable stone with which to construct the wearing surface, the bitulithic, or bituminous, macadam pavement, as constructed under the Warren process, gives every indication of being a very durable and valuable pavement.

MUNICIPAL TELEPHONES

Evansville Proposes to Run Its Own Telephone System—A Blow Aimed at Telephone Monopoly—Successful Operation of Government Telephones in London

The civic authorities of Evansville, Ind., have formed an association, the chief object of which is to establish a municipal telephone system for that city and vicinity. Those interested believe it to be the only effective and permanent way of breaking the grip of the telephone monopoly, and thus secure to itself, for all time, equitable charges for telephone service. The movement is backed by some of the leading citizens. According to the articles of the association, it proposes to establish, maintain and operate telephones and telephone exchanges within the city of Evansville and its suburbs.

The capital stock of the corporation provides for the issuance of three hundred and ninety thousand dollars in preferred and common stock, there being seven thousand and six hundred shares of the former at twenty-five dollars each, and eight thousand shares of the latter at twenty-five dollars each. The provision is made that no more preferred stock shall be issued than is necessary and sufficient to pay the whole expense of the complete installation and equipment of a telephone plant large enough to accommodate two thousand subscribers, with an ultimate switchboard capacity of seven thousand and two hundred, and for the necessary expense of extension of the system for one year after its installation.

The franchise is to be granted by the city for a period of twenty-five years, and gives permission "to erect, construct, maintain and operate along, through, over and under the streets, alleys, lanes, highways and public places of the city of Evansville, a telephone line or lines, with all necessary auxiliary fixtures, underground conduits, pipes, poles, guy wires, etc., for the purpose of operating a telephone exchange system, conveying and communicating intelligence by electricity and carrying on their business by such means within, to and from the city of Evansville."

The franchise is granted on the condition that "all cables and wires within the fire limits, except those used in reaching subscribers within the said fire limits of said city, shall be put underground in the most modern way, that all poles are to be of uniform size, so as to present a neat appearance, and all work is to be done in the most improved and workmanlike manner, under the laws and ordinances governing the erection of telephone poles, wires, etc.," now in force in the city.

The city "reserves the right to use without charge any part or all of the top cross-arm or any or all poles of the said telephone company, for the purpose of stringing wires or any wire thereon for the police patrol or fire alarm system in the service of said city; also the use of one duct of sufficient size and capacity for laying and placing wires of its own for fire alarm and police patrol therein. The said duct shall be for the exclusive use of the said city, for said purpose, all of which shall be so provided without charge to the city of Evansville, but said wires for the exclusive use of the said city shall be so placed in the conduit and on the poles as not to interfere with the free use and effective operation of said telephone company."

For rates, the franchise provides that the company, its transferees, successors or assigns, shall charge for individual full metallic circuit with long distance instrument, for business houses, not less than three dollars per month, and not more than four dollars per month, and two dollars a month for residence service. For residence long distance instrument, party line not to exceed two on a line selective signal, one dollar and fifty cents per month; for four party line, one dollar per month.

The franchise further provides that the entire plant shall be constructed in the most workmanlike way and equipped with the most modern apparatus, and shall be equal to the best service to be found anywhere in the country.

It is proposed that the Department of Public Works of the city of Evansville shall take and hold a majority of the stock of the Evansville Telephone Company, and provision is made that at no time

in the future can the controlling interest pass out of the hands of the municipality.

The MUNICIPAL JOURNAL AND ENGINEER will keep its readers informed as to the progress of this undertaking. There is no doubt in the minds of the general public that the various branches of the Bell Telephone monopoly are charging exorbitant rates for their service in all parts of the United States, and the rapid progress of the independent telephone movement has demonstrated, in many places, the value of competition, although it has, by no means, brought the price of telephone service down to where it should be in all cases. Nevertheless, the competition afforded by the independent companies has often had a salutary influence upon the regulation of prices. For instance, in many Western cities and a few cities in the East, there is a charge of only five cents per message at the public pay station, and a correspondingly low rate for unlimited service. This is in marked contrast to the high prices charged for telephone service in New York City, where the Bell Company has a complete monopoly.

It is interesting to note in this connection the progress of the municipal telephone in London. In 1889, the telephone service of London, as well as of the rest of Great Britain, was practically in the hands of one private company—The National Telephone Company. At that time a select committee was appointed by Parliament to consider whether the telephone service was, or was calculated to become, of such general benefit as to justify its being undertaken by municipal or other local authorities, regard being had to local finances. After a painstaking investigation the committee reported to the effect that general, immediate and effective competition, by either government, post office or local authority, was necessary. As a result of this finding the government, early in 1899, passed an act authorizing expenditures for this purpose, since which date the work of municipalizing telephones has been carried rapidly forward.

The attitude of the government secured immediate benefits for the public, as the National Telephone Company acceded to a demand for reduced rates and shortly afterward the Post Master General made public the terms of an agreement that had been made between the government and the company, whereby intercommunication between the subscribers to both systems was provided for, including a schedule of tariff changes. The rates of charge for the use of such systems in the London area, as stated in the agreement, were as follows: For exclusive lines a subscriber can obtain unlimited service at eighty-five dollars a year, and for each additional line on the same or other premises, he is required to pay only seventy dollars additional. It should be noted here that unlimited service in New York is not to be purchased at any price. The best possible service that can be secured requires the payment of a stipulated sum for the use of the instrument and a limited number of messages, and five cents extra per message for all over the given number. It should be remembered that an extra rate of ten cents is charged for any Manhattan subscriber calling a subscriber in Brooklyn, and even larger rates are charged for remote territory included in Greater New York. When it is known that the area of metropolitan London is six hundred and ninety-three square miles, and of New York, three hundred and eight square miles, and yet telephone service is so much cheaper in London than in New York, the contrast between the prices paid for telephone service in the two cities will be more readily appreciated. For a limited service the subscriber pays twenty dollars a year and two cents for every message within the County of London, and four cents for every message outside the County. A provision is made that all subscribers having limited service must pay at least fifteen dollars a year for the transmission of messages, which means that the minimum service will cost thirty-five dollars a year. For a two party line the rate is fifteen dollars a year, with the same charge for each message, and for a party line of not more than ten subscribers, ten dollars a year, and the same rate per message.

The only reason why American cities have to pay a larger price for their telephone service is because there is no united action on the part of municipalities to bring about a reduction in the price by various methods within their power. For instance, it is possible for a municipality to secure a reduction of rate for telephone service when it grants the franchise, by retaining such a control of the service that it will have the right to dictate the rates at any future time, should it be apparent that they are unreasonably large. It is possible, also, to establish telephone systems of their own, and if there should be a concerted effort on the part of the various municipalities throughout the country—it is a thoroughly practical proposition—not more than a decade would elapse before the monopoly would be brought into thorough subjection. This is a subject which could be profitably discussed from every standpoint by all the national, state and civic organizations of the country.

TESTS OF ROAD MATERIAL

THE work of building good roads in New York State, as told in the July issue, is supplemented by scientific inquiry into the quality of the rock of the State.

The State Engineer has found it desirable to make comparative tests of the wearing qualities of the various rocks found near the proposed roads in different parts of the State in order to determine which are the best adapted to the purpose. It has been found that a large portion of the stone is not suited to road building, the limestone being too soft while the sandstone is too brittle and friable and has no binding qualities. For the comparison of the rocks the department has had the co-operation of the engineering department of Columbia University, where is a complete outfit of the latest devices for testing crushed stone by abrasion of the fragments and by cementation of the dust resulting therefrom. The methods are the same as used by the Massachusetts Highway Commission and by the office of Public Road Inquiries at Washington. Selected fragments of stone ranging from one and one-fourth to two and one-half inches in greatest diameter, are used for the tests. Eleven pounds of these are carefully washed and dried before use. They are placed in a modification of the Deval machine which has four cylinders of cast iron, 7.9 inches in diameter and 13.4 inches in depth. These are fastened to a shaft so that the axis of each cylinder is at an angle of 30 degrees with the axis of the rotation of the shaft. Covers are fastened on the cylinders and they are rotated at a uniform rate of 2,000 revolutions per hour for five hours, or 10,000 revolutions. The contents of each cylinder are then placed on a sieve of 1/16 inch mesh. The material passing the sieve is saved for a cementation test. The sieve and stone fragments are washed in running water, the fragments are dried and carefully weighed and the difference between this weight and the original eleven pounds shows the amount worn off in the test. The percentage of the dust that passed the sieve to the original weight is taken as a basis of comparison or else the French coefficient of wear is determined by the formula which is based upon the fact that the best rocks sustain a wear of less than 2 per cent. of the original weight. The coefficient is expressed in the formula "coefficient of wear equals 400 divided by W" in which "W" is the weight in grammes of dust less than one-sixteenth inch per kilogram or per 2.2 pounds of rock used.

In making the cementation test of the material that passed the sieve, it is screened through a sieve having 100 meshes per inch and the resulting dust made into square briquettes 0.98-inch in diameter by the use of distilled water. The moistened dust is placed in a metal dye of the same dimensions. A close-fitting plug is inserted on top of the wet dust and a pressure of 1,422 pounds applied. Five of these briquettes are thus treated and are then dried in at a temperature of from 60 to 70 degrees for two weeks. They are then placed in a machine which drops a 2.2 pound hammer 0.39 of an inch on them, thus testing their strength.

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The Asphalt Trust Swindle

IN our April issue we made a statement of facts about the Asphalt Trust which showed, we thought, the limit of its corruption, but recent developments have demonstrated that the half had not been told. To fully appreciate the present revelations it will be necessary to briefly review the history of the Trust from its inception.

At the outset, however, we wish to call to the attention of our readers the fact that our exposition of the Asphalt Trust is not aimed at the asphalt paving industry as such, for there are many good asphalt paving companies outside of the Trust which are thoroughly reliable and which should not be made to suffer for the evil deeds of the Trust. We warn our readers against the Trust and before a contract is awarded to any asphalt company it should be made to disprove any charge that it is connected with the Trust.

The Asphalt Trust originated July 6, 1899, with an authorized capital of $30,000,000; upon each $50 share $10 was paid in. It now appears, from the report of Receiver Tatnall, that by this combination the promotors made millions in purchasing the stock of the subsidiary companies at a low price and then selling it to the Trust at an advanced price. For instance, among other things, it was shown that certain parties purchased shares of the Barber Asphalt Company at $48.50 per share and transferred the same to the Asphalt Company of America at the valuation of $100 per share, collateral gold certificates being received in exchange therefor. These facts were not known to the public at the time of organization and have only lately been revealed.

As everybody knows, the bonds of the Asphalt Company of America seemed, at the time of the formation of the Trust, analogous to government securities. They bore the names of Philadelphia's most eminent financiers and underneath them, of course, laid a massive foundation of $24,000,000 unassessed liability at the start. It will be remembered that banking and Trust companies bought the securities eagerly; the trustees of estates; the guardians of widows and orphans hastened to invest their funds, paying from ninety to ninety-seven per cent. of face value, although but ten dollars per share in cash had been paid in.

This confidence was largely due to the belief that the Trust had a monopoly, but early in 1900, John M. Mack entered the ring and with his associates laid the foundation for the disaster which followed. He compelled the Asphalt Company of America to take his crowd in and the National Asphalt Company was formed to absorb the scores of big and little concerns in an iron-clad trust.

At this point, with Mack in control, the swindle continued, if anything, on a larger scale. In the first place, the almost valueless plants of the Mack crowd were turned over to the National at inflated prices. Next, the unassessed liability of forty dollars a share on the stock of the Asphalt Company of America was converted into National five per cent. bonds, of which $6,000,000 were issued. The *North American,* (Philadelphia)—to which American cities are deeply indebted for its exposition of the Trust—aptly remarks, "Thus by a few strokes of a pen the security underlying the American bonds was removed, the promoters believed. This fraudulent manipulation ot the collateral for millions of invested money was considered by its perpetrators a master stroke of finance."

In less than a year from the time the National Asphalt Company was organized, with Mack in full control, rumors questioning the solvency of the Asphalt Trust were heard. These were quieted for a few months without any apparent effect upon the stock, but in October, 1901, the value of the bonds of the Trust decreased alarmingly. Prices were steadied, however, for a time by an emphatic declaration from Mack that they were an excellent investment and were earning their dividends; but the following month the bottom fell out. Bonds which had been unloaded at ninety-five sold at forty-six, and subsequently were valueless.

Then what was called a "protective committee" was appointed to look after the interests of the many bond holders, large and small. The members of this committee were men of the highest standing financially, socially, and, it was believed morally. Its dire significance was only revealed by the recent suit brought by Receiver Tatnall against the promoters of the Asphalt Company of America to recover fraudulent profits. This committee was supposedly working for the plundered bond holders, but really for the promoters and the Trust. The committee announced that in order to protect the interest of all the bond holders it would be necessary for all the stock to be placed in its hands, and ninety-seven per cent. of the bonds were thus confided to its keeping to deal with as it saw fit. While the bond holders comforted themselves with the hope of finally realizing on their holdings, the committee made a secret agreement to turn over to the promoters all the bonds it could acquire from the holders so that if Receiver Tatnall's suit is successful the non-assenting bond holders will receive $120,000 and the balance of the $4,000,000 will go to the promoters, as the bond holders who released their bonds to the committee's care by its betrayal, lost all right to share in the restitution.

Receiver Tatnall requests the court's advice in the matter of bringing suit to recover the $24,000,000 unassessed liability of the Asphalt Company of America stock. But the situation is hopeless so far as the deluded bond holders are concerned, for, by fraudulent manipulation, the promoters have made themselves invulnerable against legal attack. The promoters have the money and bond holders have the experience.

If there is any conclusion to be drawn from the crooked dealings of the Asphalt Trust it is that it will defraud in a similar manner any one with whom it has business dealings, and, therefore, it behooves city officials everywhere to have no dealings whatsoever with the Trust.

The Trust promoters well knew, before Receiver Tatnall made a move to bring the suits, that they would not be injured thereby, and, therefore, it is reasonable to suppose that these suits have been instituted for the purpose of detracting attention from their more vulnerable points. For instance, is it not practicable to bring suits against the receiver to recover damages to the asphalt properties entrusted to his care? It can be shown, we believe, that both prior and subsequent to the receivership, gross mismanagement prevailed. We have shown in previous issues of THE MUNICIPAL JOURNAL how the Trust, through mistaken economy, discharged its best and most experienced men, those of practical training in the business, filling their places with men having little or no experience, at lower rates of wages. We also called attention to the ruinous policy of taking contracts at less than cost of construction in the effort to drive out competition. The published reports of the receiver show nothing of the management of the business during the two years it has been

in his hands. There seems to be a suspicious silence on this point. The liability of the Asphalt Company of America consisted of its issue of gold bonds of $30,000,000, upon which was realized at the receiver's sale, $6,006,000, leaving an apparent deficit of $23,994,000, but the Receiver reports a deficit of $27,750,000; so that between the apparent and reported deficits there is an unexplained difference of $3,756,000.

The inference is that this shortage is the loss in operating expenses for the two years the Receiver managed the property, and that it took this amount to make good the obligations contracted by the Receiver, which, of course, must be paid before anything could go to the creditors of date prior to the receivership. When it is considered that during this period the receiver has not been obliged to pay interest on capital; that he has done a very large business—the largest ever known in the industry; that the period has been one of the most successful in general business ever known in the country, and that, prior to the Trust organization the business had always been successful, this condition is more surprising and inexplicable.

At first, the Trust having confidence in its monopoly of the business, advanced prices so that in cities like New York and Philadelphia it obtained from three to six dollars a square yard. Soon competition developed and the Trust began to slaughter prices in order to drive out all competition, expecting thereby to again get the cities within its power. This ruination policy continued for nearly three years with the disastrous results above shown.

The question naturally arises, By what right did the Receiver undertake a losing business at the evident expense of the securities and the property purchased by its wreckers at twenty per cent. of its book value?

In our April number we issued a note of warning which has called forth many words of appreciation. We reiterate this warning with greater emphasis. City officials should not be deceived by this ruination policy of the Trust into the belief that a good asphalt pavement can be laid for $1.10 a square yard. It is among the impossibilities. The very fact that the cheap pavements of the Trust are rapidly going to pieces in New York and elsewhere is sufficient warrant for this statement. The New York *Herald*, for some weeks past, has been conducting a crusade against the rotten asphalt pavements which have been laid by the Trust in New York City. Cities can well afford to pay a price for any pavement which will allow a reasonable profit. If they do not do so they are sure to suffer in the end. With its ill-gotten gains, the new Trust which has arisen from the ruins of the old, is seeking to extend its grip and now offers competition in every kind of pavement laid, as its articles of incorporation permit it to contract for any sort of pavement or material. If the Trust comes into competition in any city with the legitimate companies doing business in the asphalt, brick, bitulithic or wood pavement fields, city officials may be assured that it will be to their advantage to have nothing to do with the Trust or its agents. In a future number we propose to show up some of the rotten Asphalt Trust pavements in New York.

Value of Advance Information to Advertisers

THERE is no kind of advertising which pays so well as that placed in class journals. As compared with the returns received from those mediums which give a simple publicity, the results received from advertising in a class journal are disproportionately large. The publicity medium takes the advertiser's money and gives him as much space as he is willing to pay for and the publishing of the ad ends the responsibility of that medium. If the advertiser gets results he is in luck and to be congratulated. If he receives no material benefit the publicity publisher shrugs his shoulders and says, "We can and do give you the circulation but we cannot insure the sale of your goods," and that ends the discussion.

How different the attitude of the class journal publisher! He takes the advertiser's money for a given amount of space and from that moment feels his responsibility to bring adequate returns for the money received and conducts himself accordingly. In the first place, he gives valuable advice, free of charge, as to the composition, make-up and style of the ad so as to put it in the most attractive form and gives it pulling qualities. Second, at the expense of thousands of dollars, he has established a bureau of information and from many sources gathers advance news for the benefit of the advertiser, which is compiled, classified and condensed in bulletin form and mailed to his address once a week. That this advance information is deeply appreciated is indicated by the following quotation from a facetious letter of one of our advertisers who failed to receive promptly his news service:

"Kindly walk all around on the necks of your mailing department and find out why it is that I do not receive any copies of your advance news. My soul yearns for advance news. The mental pabulum that emanates from your office on little pieces of blue paper is, I find from long mental assimilation, necessary for the proper conservation of my mental strength, and, incidentally, the saving of my nerve force. By having some one else combine and condense the information that I need, my mental faculties are soothed. You know how soothing it is to have some one else do work for you.

"I must have advance news. Therefore, please see that I get advance news, and if you can advance me any news in advance of advance news I shall be under eternal, external, and when I see you, internal obligations to you."

We make it our business to promote the prosperity of our advertisers and that we succeed is sufficiently indicated by the statement that we seldom loose an advertiser except by death or immigration.

"Why Engineers Should Advertise"

THIS caption is the title of a paper read by Mr. George H. Gibson, a member of the class of '99 of Michigan University, before a recent meeting of the University of Michigan Engineering Society. Mr. Gibson takes such a sensible view of the situation that we feel like giving our readers the benefit of his views. He said in part:

"We hear much nowadays about the dignity, the honor and the glory of the engineering profession, at the same time the correspondence columns of the technical journals are filled with complaints concerning the meagre compensation usually received by engineers. These things do not harmonize. If the engineers, by virtue of their skill, ability and integrity, are indispensable in this industrial age, why are they not better paid? There are but two classes of people who can be held responsible for this state of affairs, viz., the engineers themselves and their employers, the public. Some of the blame rests upon each, but most of it upon the engineers.

"In the first place, most people, including many otherwise well informed, have a very hazy notion of what an engineer is and what he does. They perhaps think of him as somewhere between a highly skilled mechanic, or artisan, and a professional man consulted as an expert in cases of dire necessity. They rarely regard him as a man of affairs, capable of directing and conducting large enterprises. That this is the case is shown very clearly by the attitude of State and municipal governments toward engineers and their salaries. For instance, the wealthy State of New York advertises for engineering assistants in the office of the State Engineer, offering the munificent salary of five dollars per day for days actually worked, nothing for overtime. Bricklayers in many cities are paid five dollars and twenty cents for eight hours' labor and double pay for overtime. The "buyers" of department stores often receive more than two thousand dollars a year.

"Now it is plain that the only way in which public opinion in regard to these matters can be reformed is by education, and it is equally plain upon whom rests the responsibility of doing the educating. The engineers must speak for themselves. They must educate the public in engineering matters. It is as much to the interest of engineers as of lawyers or bankers to take an interest and part in public affairs and to educate and direct public opinion. The engineer should advertise the engineering profession for the good of both the profession and the public.

"Much is also to be expected from the efforts of those, notably Mr. C. F. Scott, now president of the American Institute of Electrical Engineers, who are endeavoring to draw the national engineer-

ing societies together into a united, harmonious and powerful body. Since the above was written, Mr. Carnegie's generous offer of $1,000,000 to erect a building in New York City for the national engineering societies has placed this movement upon a substantial footing.

"The timeliness and importance of such movements are manifest when we consider that fifty years hence the engineer will probably hold a position of vast power and influence in the social organism. His work touches organization, financiering, management and ultimately, statesmanship. He is forced to study political economy thoroughly and at first hand. He is destined to become and is becoming the leader of vast industrial organizations and perhaps eventually of the world itself. In the beginning the world was superstitious and ignorant and its rulers were priests; these were followed by soldiers who have disciplined it, and these again by lawyers, who have established the principles of civil rights. The great questions of the present and future are industrial and commercial. Science and invention should naturally, it would seem, place the sources of wealth and power in the hands of the engineers, who should next hold the reins. This is not to be understood in any absolute or revolutionary sense, but it is to be noted that the professionally trained engineer is more and more becoming a man of affairs. His active life, exacting duties, accurate habits of thought, earnestness and integrity fit him to be the leader and adviser of men.

"However, our exultation in the bright prospects of the engineering profession has perhaps caused us meanwhile to forget the individual engineer. As above pointed out, his pay is not always commensurate with his prospects and he cannot live comfortably upon prospects in general and nothing in particular. His practice of the 'art of directing the great sources of power in nature for the use and convenience of man,' is not always supplemented by the art of being well paid for that practice. It would seem that there should be no great difficulty in selling at a good price services so profitable to the purchaser as those of the engineer, but it appears that he usually fails to do it.

"Careful consideration of the subject seems to indicate that the limited financial success of many technical men arises more from lack of business perspective and enterprise than from anything else. First, they do not advertise enough. It is one of the first duties of every man to let the world know what he is good for. Honest advertising pays both parties concerned."

Vetoes Crematory Ordinance

MAYOR SNYDER, of Dayton, O., acted wisely in vetoing an ordinance so phrased as to practically prohibit competition in the choice of a creamatory for the disposal of the refuse matter of the city. He justifies his veto by saying:

"The disposal of the garbage is an important detail of our municipal operations involving as it does the comfort and health of the community. The city should therefore be diligent in securing a device based upon the most advanced and modern principles and economy in purchase, and saving to the taxpayers should be encouraged by competition."

"Philadelphia Corrupt and Contented"

THE one word "contented" in the above caption describes the cause of Philadelphia's corrupt municipal government. It was aptly used as the title of a fifteen page "story" in the July number of *McClure's* magazine, by Lincoln Steffens, in which he graphically portrays the wretched state of affairs as found in Philadelphia. Mr. Steffens thinks well of Mayor Weaver, who, although nominated and elected by the machine, has disappointed its friends in many ways and declares that he will not stand for many things. Many Philadelphians are expecting Mr. Weaver to carry out certain reform ideas. "But suppose they are right in this expectation?" asks Mr. Steffens.

"Think of a city putting its whole faith in one man, in the *hope* that John Weaver, an Englishman by birth, will *give* them good government! And why should he do that? Why should he serve the people and not the ring? The ring can make or break him; the people of Philadelphia can neither reward nor punish him. For even if he restores to them their ballots and proves himself a good Mayor, he cannot succeed himself; the good charter forbids."

We too, have shared, with many Philadelphians, the hope that the new Mayor would be enabled to make good his promises for a reform government, but the recent transactions in connection with the construction of the filtration plant, as reported by the press, and the evidence that the city continues in the grasp of the asphalt trust, not to mention other reasons, seem to indicate that the chief executive is pretty thoroughly under the control of the machine. Nevertheless, we are loth to believe that even in the direst extremity he will stoop to the low methods practiced by his predecessor, for we believe him to be a man of altogether a different type, and that, while, under great pressure, he may yield certain things to the machine, he will not use his high office for his personal gain.

We heartily commend the good work of *McClure's* magazine in thus calling attention to the corrupt condition of some of our great cities. Though it gives wide publicity to an unpalatable subject, it cannot fail to encourage the increasing number of citizens who are demanding better government in American municipalities.

Public Playgrounds

THE Civic League of St. Paul has recommended that steps be taken to establish playgrounds in connection with all the public schools of the city. Every municipality whether it be large or small, should adopt definite measures for the establishment of such playgrounds, not only in connection with the public schools but elsewhere in the more crowded centres of the larger cities. Public playgrounds equipped with apparatus for an outdoor gymnasium and with space reserved for the use of the kindergartners, have already demonstrated their value in many cities by decreasing the number of arrests of children for petty thefts in their immediate vicinity. People are crowding to the great civic centres in vast numbers annually, and for the sake of making better citizens, if not for the pleasure of the people, playgrounds and small parks should be rapidly multiplied. The cost, as compared with the great good bound to result, is insignificant.

Patented Pavements Can Be Used in New York

IN the July issue of the MUNICIPAL JOURNAL AND ENGINEER we called attention to an absurd provision of New York's charter, as brought out by the decision of Justice O'Gorman in making permanent the injunction against President Cantor restraining the use of patented bitulithic pavement, on the ground that the charter strictly prohibited the use of any patented pavement. An appeal was made to the Appellate Division of the Supreme Court of New York, which has just handed down a decision reversing the findings of the lower court, relative to the meaning of Section 1554, of the charter, which reads as follows:

"Except for repairs no patented pavement shall be laid, and no patented article shall be advertised for, contracted for or purchased except under such circumstances that there can be a fair and reasonable opportunity for competition, the conditions to secure which shall be prescribed by the Board of Estimate and Apportionment."

The Supreme Court declares, that in order to contract for a patented pavement, bids should be received on some other form of pavement as well as on the patented pavement, and that if the bid on the patented pavement is lower than those on the other forms of pavement selected to be placed in competition, then the President of the borough could award the contract for the patented pavement without further consideration. If, on the other hand, it was desired to award the contract for the patented pavement at a higher price than the low bid, then it would be necessary to have the matter referred to the Board of Estimate and Apportionment and the contract could be let for the patented pavement by a two-thirds vote of the Board. The Corporation Counsel has advised the presidents of the various boroughs of New York that they can proceed to advertise for the use of bitulithic pavement under this decision of the higher court.

Asphalt Trust Gets Contract in Philadelphia

WITH characteristic liberality, the Philadelphia authorities have awarded the contract for asphalt paving to the local representative of the trust. This is regarded, in the Quaker City, as a distinct victory for John M. Mack, as it is said that he pledged himself to protect the interests of the General Asphalt Company in his city; and he has made good. But why he should charge only two dollars and nineteen cents a square yard is more than we can understand, for he doubtless could have had more for the asking. Because the trust took several hundred thousand dollars' worth of business at the rate of one dollar and ten cents per square yard is no reason why the trust should pinch itself so painfully in Philadelphia. We fail to understand this seeming modesty.

City Should Employ Efficient Labor

THE Springfield (Mass.) *News* is making an unwise plea, supposedly for the benefit of the taxpayers, for the employment of worn out and old men in doing certain city work. Such a policy has been tried in other cities and abandoned because it has been expensive and inefficient. The city of Troy for a number of years paid a lot of old men a dollar and a half a day for eight hours' work to sweep its streets on just such a plea, that it would keep them out of the poorhouse where they would become a charge on the city. During all that time the streets were poorly swept and fully one-third more men were employed at that rate than need have been employed if able-bodied men had been selected. The practice was finally abandoned because of the unsatisfactory results. There are elemosynary institutions in every city where the disabled old men can find the temporary relief they need generally only through the winter months, so they would not suffer if they were not appointed to such a position as suggested by the *News*. It should be the aim of every city to obtain a dollar's worth of work for every dollar expended in salaries, and no good reason can be offered why this should not be expected.

Wanton Waste of Water

"THAT which any one with half an eye could see was coming has come—a scarcity of water," wails the editor of the Indianapolis *News*. "Yard hose is used all day and all night long. There are premises where the water runs flowing down the gutter in streams a half square long to the sewer. In some business places nails are put in the faucets so as to set it open and the tap runs the year round. Little attention is paid to the law against sprinkling when there is a fire alarm, and no attention, practically, to the forbidden hours for sprinkling."

There are two reasons for this wanton waste of water. First, consumers of water have the erroneous impression that it is as free as the air, even though they pay a small water tax annually. We will admit that water is free in the river and that any one who wishes to establish his own water service by carrying it to his residence in a bucket, barrel, or by the use of other means that does not interfere with the general public, is at liberty to do so, but at his own expense. If he were to adopt such a measure he would find that it would be more expensive than the present system. Second, because water meters are not used. Water meters furnish an effective means for checking such wanton waste of water as is referred to by our contemporary. The citizen who pays ten, twenty, thirty or forty dollars a year, as the case may be, flat rate, for his water service, does not care how long the sprinkler runs, nor how defective his water pipes or plumbing may be, but the moment he begins to pay for his water service on the meter basis that moment he becomes a most efficient inspector of the water pipes and service on his premises. If he finds a leak in the plumbing he has it repaired at once, for he can better afford to pay the plumber's bill than to pay for the water which runs to waste. If he discovers that Bridget is leaving the faucet open in the kitchen, or the children have left the faucet open in the bathroom, he scolds and lays down a few rules which he is careful to see are obeyed. There is only one way for a water company to sell water, and that is by measure; and the demands for the use of meters becomes all the more imperative when the supply of a given city is running short.

"Kansas City's Great Record"

UNDER the above caption our contemporary, the Kansas City (Mo.) *World* calls attention, in a lengthy editorial, to the quick recovery of that city from the devastation caused by the recent flood. As it takes occasion to commend the city officials as well as other citizens for their work, we take pleasure in quoting its words:

"All the city officials, as well as the business and professional men of Kansas City, took hold of the work with a common purpose and the satisfactory results attained have excited the admiration of the entire nation.

"During his term of office as chief executive of Kansas City, Mayor James A. Reed has developed qualities as an administrative official that are somewhat rare among municipal officeholders. He has fearlessly assailed corruption in the city council and as a direct result of his reform crusade a combination of city aldermen who were responsible for giving away valuable city franchises without the consent of the public were driven from office. As chief executive of the city and also as a member of the Bar association committee he labored zealously to stamp out corruption about the courts and as a result numerous jury bribers have fled the country. His successful efforts to secure a just and equitable assessment of the property of the tax-dodging public service corporations, has won the good will and high regard of the business men and property owners of Kansas City, but his powers of organization and the exercise of good business judgment under the most trying conditions during the recent flood have won for him the lasting gratitude of the people of Kansas City.

"The phenomenal record made by Kansas City during the past thirty days constitutes an important chapter in the list of long successes achieved by this municipality. Like the rebuilding of the Convention hall in ninety days for the purpose of holding the Democratic national convention in 1900, its phenomenal recovery from the devastation of the flood has given Kansas City an advertisement world-wide in extent."

Nashville's Lighting Plant

THE city of Nashville has just completed the first six months of its experience with municipal lighting and the superintendent reports that electric current has cost the city at the rate of 2.64 cents per kilowatt. Every expense, including interest, with the exception of the unestimated amount for depreciation, was reckoned in the cost. At the end of the next twelve months it will be possible to make even a better showing as it is always conceded that the cost of operation of a plant for the first six months is greater than for subsequent periods. Mayor J. M. Head, who will retire in the middle of October—the Nashville charter does not permit a mayor to succeed himself—deserves the credit for the installation of this successful municipal plant. It is simply another instance to prove the practicability of a city's operating its own electric light plant. Before the plant was installed, however, the city began to profit from the undertaking, as the private company which had been previously serving the city was obliged to cut its rates for street lighting and for incandescent lighting furnished to private consumers, as well as for power purposes. It is now selling current at the rate of five cents per kilowatt hour. These cities which are paying from ten to twenty cents per kilowatt hour can comfort themselves with the hope that some time in the distant future they may be able to get it at an equally reasonable rate.

The Bell Company's Methods

OUR contemporary, the *Virginian Pilot*, of Norfolk, Va., charges the Bell Telephone Company with crooked work in securing its franchise in the city of Richmond, which was met by an explanation from the promoters "that there had been no bribery but that thousands had been spent in wining and dining members of the Councils and taking them on junkets to New York." The *Pilot* pertinently asks, "What is the difference between spending seven hundred dollars on a bunch of councilmen on a junket, if they know they are given the junket to influence their votes, and dividing seven hundred dollars in cash between them?

"Morally, the one is just as base as the other and just as much bribery as the other.

"We believe that we do not exaggerate the case when we say that the Bell Telephone Company's methods of 'influencing public opinion' —which have been so frankly stated—have done as much to debauch and corrupt politics and public officials in this city as any other single agency."

The experience of Richmond is that of every other municipality in the country where the Bell Telephone Company has installed its system. One way of bringing the Company to reasonable terms would be to grant a franchise to a competing company or establish a municipal telephone at the expense of the city. Municipal telephones have become very successful abroad and there is no reason why they should not meet with as great success on this side of the Atlantic.

Tax on Street Cars and Vehicles

An effort is being made to pass a vehicle tax through the City Council of Columbus, O., and its final passage is hindered because certain members take the ground that unless street cars are taxed the vehicles should not be taxed. We do not think that street cars should be taxed at all, for there are other more equitable ways of taxing a street railway corporation. It would be much wiser if the Council would seek to secure a further reduction in the tare so that people of the entire city could share in the benefits thus secured. If a tax of twenty-five dollars per car is levied upon the cars in service and the funds secured turned into the public treasury the property owners would be the only ones who would profit thereby while the majority ot the Columbus citizens would fail to receive any benefits therefrom because they own no property. The reduction of the fare would be in the nature of a tax on the street railway company, but one in which all the people would share to the extent of their investment, one which would be appreciated by the poor washerwoman who is obliged to use the street car to go to and from her daily work, to whom it means much more than to the property owner, as it takes eight or ten cents out of her hard-earned dollar a day. There is no reason why every vehicle should not be taxed to a small extent. It is a general practice throughout American cities, but there is every reason why a street car should not be directly taxed. Make the transportation company reduce its fare and so give all the people a chance to benefit thereby rather than confine it to the limited class of taxpayers.

The Burial of Wires

The St. Louis *Republic* calls attention to the fact that one year ago there were nearly forty-five thousand poles in the streets and alleys exclusive of the railway poles; seven hundred and thirty-three miles of pole lines in the streets and one hundred and fifty-four miles in the alleys, not including the railway lines of that city. It exhorts the Board of Public Works to enlarge the present underground district so as to compel the burial of wires in the entire central territory, and to arrange, if possible, for extending the system outside of this new district an any time under fair conditions. It maintains that there should be a larger district in which the burial of wires should be compulsory and that there should be liberal provision for permitting the construction of conduits outside such districts. The need of St. Louis is the need of every city in the United States. Overhead wires are multiplying to an alarming extent, and our civic authorities should adopt the most urgent methods to secure the placing of all wires underground, particularly in the business sections.

Protect the Trees

Every city needs more trees than it possesses, but too little attention is given to tree planting and tree culture. This does not arise from lack of appreciation but rather from lack of attention on the part of city officials. "What is everybody's business is nobody's business," is an old saying, but never so true as in this connection. We have park superintendents who generally care for the trees and shrubbery in the parks, but there are few cities where the street trees are consigned to the care of a special official. Springfield, Mass., is one of the exceptions to the rule, and its forty thousand street trees are constantly looked after by a city forester and corps of attendants. Besides the city forester sets out a large number of trees annually. Thus that New England city has become one of the most beautifully shaded cities in the country. If great expense were entailed in the creation of such a department there would be some excuse for the barren city streets, but inasmuch as it can be established and maintained at a comparatively slight cost, we see no reason why this branch of city development should be so universally neglected. Protective measures also should be adopted by every municipality to prevent injury to the trees from insects, the thoughtless small boy and horses, not to mention the use of the methods adopted by the tree culturist in the preservation of trees.

A Useful Civic Organization

There is no body of men banded together for the betterment of commercial and civic interests that has achieved more satisfactory results than the Merchants' Association of San Francisco. From its inception it has made a practice of doing things, and there are few important improvements which have been brought about in the city of the Golden Gate in which this association has not been an important factor in its achievement.

President Symmes revealed the secret of the association's success when he referred to the aims of the organization in his recent address at the semi-annual dinner, which, he said, were based on the words of President Roosevelt: "There is no royal road to good government. Good government comes to the people, the bulk of whom show, in their relation to that government, the humdrum ordinary work-a-day virtues." Mr. Symmes said that, "what President Roosevelt preached is pretty nearly what the Merchants' Association practices. Good citizenship is in evidence in everything which this association attempts and when we have anything to do in public matters we do it in the same spirit that characterizes our work in our own homes and in our private affairs."

High Priced Street Cars

"Philadelphia is the only large city in the country in which street car signs are not so legible as to enable persons on the sidewalks to see where they are bound," says the *North American,* of that city, "but the Rapid Transit monopoly threatens to come out of its Rip Van Winkle trance and equip its cars with such signs in time. No unseemly haste to be shown in making this startling improvement. New cars will have such signs when turned out of the shops and signs will be placed upon the cars from time to time, probably from year to year." It might have added that Philadelphia is the only city where all passengers paying a five-cent fare have to pay three cents extra to get a transfer.

Prices for Arc Lighting

Urbana, O., June 24, 1903.

Editor, Municipal Journal and Engineer:

The Mayor of our city has suggested our writing to you with respect to the cost of municipal lighting. Our situation, in brief, is as follows: There is a local municipal plant in this city of 7,000 people, with a contract for one hundred and two lamps at $80 each per year. The contract has four years yet to run. The property of the local plant has been sold—including the city contract, of course—to the D. S. & U. interurban traction plant, operating between Dayton and this city. This Company has built, and is operating, an immense power plant for the transmission of power for its cars along its entire route. It is now bringing into this city a high tension wire of 25,000 voltage. The operating Company wishes a new contract with the city, for which it agrees to give the city reduced cost of service per lamp in consideration for a ten-years' contract or agreement. The point with us is as to the cost per light to be provided for in the new contract. If the old Company, with its expensive first cost, could operate successfully at $80, it occurs to us that the Traction Company, having its own power already at hand, could light the city for a considerably less sum than its predecessors.

Will you not kindly give us your judgment from this statement of facts, and very much oblige?

H. D. M.

You should get your light for not over $60, and under the circumstances, we should expect the company to make a good profit at $50. The appended table of lighting statistics for cities from your size up to 10,000 shows that, while some are paying more, the majority are paying less.—[EDITOR.

	Population.	Number of lights.	Price per arc per year.	Hours of service.	Candle-power.	Price of fuel.
Anniston, Ala.	10,879	66	$75.00	(2)	*	$2.05
Americus, Ga.	7,674	82	59.66	3,000	†	2.80
Annapolis, Md.	10,000	46	90.00	3,800	*	2.60
Athol, Mass.	8,000	54	75.00	(2)	†	4.50
Albuquerque, N. M.	10,000	24	60.00	(2)	*	3.00
Albany, Ore.	7,000	16	90.00	(1)	*	....
Anderson, S. C.	7,000	100	45.00	(1)	*	....
Brunswick, Ga.	9,081	52	80.00	4,015	*	3.65
Brazil, Ind.	7,786	100	50.00	(2)	*	3.25
Boone, Ia.	8,880	81	70.00	(2)	†	1.25
Bowling Green, Ky.	8,226	72	51.59	(2)	*	....
Brainerd, Minn.	10,000	60	72.00	(1)	*	....
Burlington, N. J.	8,500	25	90.00	(1)	*	....
Bellaire, O.	10,000	90	60.00	(1)	*	1.00
Bloomburg, Pa.	8,000	70	80.00	3,000	†	....
Beaumont, Tex.	10,000	50	72.00	(2)	*	....
Brenham, Tex.	10,000	20	72.00	(1)	..	....
Champaign, Ill.	10,000	150	65.00	3,000	*	1.25
Connersville, Ind.	9,744	90	75.00	(1)	*	2.30
Creston, Ia.	7,752	26	66.33	(1)	*	1.50
Calais, Me.	7,500	86	60.00	(3)	*	4.50
Cloquet, Minn.	8,072	25	90.00	(1)	†	....
Columbus, Miss.	7,500	45	72.00	3,500	*	1.85
Chillicothe, Mo.	8,000	55	60.00	4,000	*	2.50
Clinton, Mo.	7,000	46	75.00	(2)	*	2.00
Canandaigua, N. Y.	7,000	92	80.00	(4)	*	2.75
Corning, N. Y.	10,000	88	80.00	(1)	*	2.40
Cortland, N. Y.	8,500	142	104.00	(2)	*	2.80
Cambridge, O.	10,000	112	65.00	(1)	*	....
Circleville, O.	9,000	127	62.00	2,800	†	1.35
Carnegie, Pa.	9,000	80	80.00	(1)	*	....
Connellsville, Pa.	10,000	25	65.00	(1)	*	4.00
Conshohocken, Pa.	9,000	50	87.50	4,000	*	2.55
Charlottesville, Va.	10,000	100	50.00	(1)	..	2.75
Derby, Conn.	7,930	57	57.00	2,100	†	4.00
Dixon, Ill.	7,918	67	80.00	3,680	*	2.50
Delaware, O.	10,000	133	75.00	(2)	*	1.60
Dennison, O.	8,000	101	50.00	(1)	*	....
Danville, Pa.	8,000	65	62.00	(1)	*	2.25
Eureka, Cal.	8,000	65	96.00	4,000	*	7.50
Emporia, Kan.	8,223	71	78.00	(2)	*	3.45
Escanaba, Mich.	9,000	68	102.00	(2)	†	3.50
Elyria, O.	10,000	115	82.50	(1)	*	1.70
Fort Madison, Ia.	9,278	64	67.50	(2)	*	2.00
Frankfort, Ky.	10,000	72	96.20	(1)	*	2.35
Frostburg, Md.	7,000	42	72.00	(1)	*	2.00
Faribault, Minn.	9,000	53	51.00	(2)	*	4.20
Fulton, N. Y.	8,000	79	80.00	(1)	*	2.70
Fostoria, O.	10,000	123	90.00	4,000	*	....
Fremont, O.	9,000	80	70.00	(2)	*	....
Franklin, Pa.	10,000	108	55.55	(2)	†	1.65
Gardner, Mass.	9,000	69	75.00	(2)	†	4.75
Goldsboro, N. C.	8,000	16	.....	(1)	†	3.44
Greenville, O.	7,000	95	78.00	(1)	*	2.70
Galion, O.	9,800	103	72.00	.....	*	....
Huntsville, Ala.	8,068	74	90.00	(1)	*	1.85
Hot Springs, Ark.	9,973	40	162.00	(1)	*	‖4.25
Hopkinsville, Ky.	7,280	64	83.00	4,000	*	1.30
Hackensack, N. J.	8,000	50	84.00	4,000	..	3.00
Hoosick Falls, N. Y.	7,000	70	77.50	(1)	†	4.20
Hudson, N. Y.	10,000	111	108.00	(1)	†	3.75
Iowa City, Ia.	7,987	112	72.50	(2)	*	....
Iron Mountain, Mich.	8,000	52	91.25	(2)	†	4.20
Ironwood, Mich.	8,000	60	93.00	(2)	*	3.40
Jefferson City, Mo.	7,000	71	65.00	(1)	*	2.50
Johnstown, N. Y.	10,000	96	84.36	4,000	..	6.00
Kearney, Neb.	8,000	15	105.20	(1)	*	3.70
Kewanee, Ill.	8,382	47	70.00	(2)	*	2.00
La Porte, Ind.	7,113	123	69.12	(3)	*	2.60
Ludington, Mich.	9,000	49	60.00	(2)	*	....
Lexington, Mo.	8,000	50	70.00	(1)	*	1.65
Louisiana, Mo.	7,000	35	80.00	(2)	†	2.00
Little Falls, N. Y.	10,000	111	90.00	(1)	*	3.25
Lancaster, O.	10,000	110	85.00	(1)	*	2.50
Lead, S. D.	7,500	21	180.00	(2)	*	6.00
Laramie, Wyo.	8,600	11	150.00	(1)	*	2.25
Mt. Clemens, Mich.	7,000	81	58.12	(1)	†	2.80
Monmouth, Ill.	7,460	107	66.00	(2)	*	1.98
Madison, Wis.	7,835	125	80.00	(1)	†	1.60
Marblehead, Mass.	8,000	58	87.50	(1)	†	....
Marquette, Mich.	10,000	94	75.00	(1)	*	....
Monroe, Mich.	7,000	86	60.00	(1)	*	2.15
Marshall, Mo.	7,000	38	60.00	(2)	*	....
Moberly, Mo.	10,000	45	80.00	(2)	*	2.25
Middletown, O.	10,000	111	84.00	(1)	*	2.10
Mauch Chunk, Pa.	7,000	30	75.00	(1)	*	....
Mt. Pleasant, Pa.	7,000	28	70.00	(1)	*	1.00
Montpelier, Vt.	8,000	172	42.00	(2)	†	....
Marrill, Wis.	10,000	70	55.00	(1)	†	....
Natick, Mass.	9,500	20	78.00	2,000	†	5.15
No. Abbington, Mass.	10,000	25	70.00	(2)	†	4.50
Nevada, Mo.	10,000	84	85.00	(1)	*	1.25
No. Tonawanda, N. Y.	10,000	112	77.00	(1)	†	....
Norwich, N. Y.	7,000	60	75.00	(2)	†	2.65
Nyack, N. Y.	10,000	71	115.00	(1)	†	....
New Philadelphia, O.	7,000	89	34.00	(2)	*	....
Norwalk, O.	7,074	104	70.00	2,190	*	1.60
New Whatcom, Wash.	10,000	37	72.00	(1)	*	‖2.00
Oskaloosa, Ia.	10,000	25	120.00	(2)	*	1.00
Oneonta, N. Y.	8,500	73	109.00	(1)	*	....
Owego, N. Y.	7,000	77	56.50	(1)	†	2.80
Owatonna, Minn.	7,000	43	72.00	2,900	†	3.35
Pasadena, Cal.	9,117	51	78.00	(2)	*	12.00
Putnam, Conn.	7,500	55	81.82	1,800	†	4.75
Pekin, Ill.	8,420	15	66.00	3,500	†	1.75
Parsons, Kan.	7,682	55	72.00	(1)	*	....
Palmer, Mass.	7,000	80	75.00	(2)	†	4.90
Plattsburg, N. Y.	10,000	56	75.00	2,920	*	4.40
Portchester, N. Y.	10,000	68	95.00	.....	†	....
Port Jervis, N. Y.	10,000	121	74.00	(1)	*	1.55
Plainsville, O.	8,500	96	80.00	(2)	*	2.15
Phoenixville, Pa.	8,514	60	85.00	(1)	*	1.80
Plymouth, Pa.	10,000	60	75.00	(1)	*	1.00
Portsmouth, Neb.	10,000	112	105.00	(1)	†	....
Rome, Ga.	7,291	90	96.00	(1)	*	2.25
Rockland, Me.	8,000	62	100.00	2,650	†	3.75
Rahway, N. J.	9,000	25	80.00	(1)	*	....
Rockville, Conn.	7,287	78	75.00	(2)	†	4.00
Rochester, Minn.	8,000	114	.....	(2)	*	4.15
Rhinelander, Wis.	7,000	30	72.00	(2)	†	....
Southbridge, Mass.	8,650	68	77.65	(2)	†	4.95
Spencer, Mass.	7,500	71	78.00	1,688	†	4.35
Sault Ste. Marie, Mich.	8,000	82	50.00	(1)	†	....
St. Cloud, Minn.	10,000	42	80.00	(1)	*	....
Salem, O.	8,000	134	70.00	(2)	†	1.60
Sharon, Pa.	10,000	64	76.00	(1)	*	1.85
Sunbury, Pa.	9,810	80	67.00	(1)	*	....
St. Albans, Vt.	8,000	66	70.00	(2)	..	4.50
St. Johnsbury, Vt.	9,000	70	64.30	(1)	*	5.60
Stevens Point, Wis.	10,000	73	78.00	(2)	*	3.25
Tamaqua, Pa.	8,000	82	80.00	(1)	*	1.45
Trenton, Mo.	7,000	30	90.00	(1)	†	2.50
Urbana, O.	8,000	102	80.00	(1)	*	2.30
Vallejo, Cal.	7,965	72	100.00	(2)	†	....
Walla Walla, Wash.	10,000	75	92.00	(1)	†	3.25
Warren, Pa.	8,000	44	75.00	(1)	†	....
Westerly, R. I.	10,000	29	75.00	(3)	†	....
Wallingford, Conn.	9,000	89	69.58	(2)	†	4.19
Willimantic, Conn.	8,937	86	92.00	(1)	*	....
Ware, Mass.	7,800	51	70.58	(2)	†	4.50
Webster, Mass.	8,000	64	80.00	2,000	†	4.20
Watertown, Wis.	9,600	67	60.00	(3)	†	2.75
Washington, Ind.	8,551	144	75.00	(2)	*	1.29
Waukegan, Ill.	9,426	110	78.00	(2)	*	2.99
Wabash, Ill.	8,618	30	76.00	(1)	*	1.35
Wooster, O.	7,000	87	60.00	(2)	*	....
Xenia, O.	8,500	112	63.00	2,750	*	....
Yazoo, Miss.	8,000	29	108.00	(2)	*	2.90

* 2,000 candle-power. † 1,200 candle-power. (1) All night. (2) Moonlight schedule. (3) Until midnight. (4) Until 1:30 A. M. ‖ Wood, per cord.

Convention Dates

AUGUST

The State Association of New Mexico Firemen will meet in convention at Santa Fé, N. M., on August 12th to 14th. A. M. Dettelbach, secretary, Santa Fé.

The New York State Firemen's Association meets at Gloversville, N. Y., on August 18th to 21st. Thomas Honohan, secretary, Frankfort.

The annual convention of the State Firemen's Association of Virginia will be held at Danville, Va., August 20th and 21st. G. G. Cummings, secretary, Portsmouth.

SEPTEMBER

The eighth annual convention of the International Association of Municipal Electricians will be held at Atlantic City, N. J., September 2-4. Frank P. Foster, secretary, Corning, N. Y.

The International Association of Fire Engineers will hold its next annual convention at Atlantic City, N. J., September 8th to 10th. Henry A. Hills, secretary, Wyoming, O.

The New Jersey State Firemen's Association meets at Atlantic City, N. J., September 9th. William Exall, secretary, 823 Broad street, Newark.

The National Firemen's Association will meet at Chicago, Ill., on September 28th and 29th. D. W. Gillen, secretary, 176 Monroe street, Chicago.

OCTOBER

The next meeting of the League of American Municipalities will be held at Baltimore, Md., October 7th to 9th. John McVickar, secretary, Des Moines, Iowa.

The State Firemen's Association of Pennsylvania holds its annual convention at Allentown, Pa., October 6th to 10th. W. W. Wunder, secretary, Reading.

The next annual meeting of the American Society of Municipal Improvements will be held at Indianapolis, Ind., the latter part of October. George W. Tillson, secretary, Municipal Building, Brooklyn, N. Y.

Personalities

—Mr. John B. Burris has been elected mayor of Woodlawn, Ala.

—Charles D. Bird was inducted into the office of mayor of Wilmington, Del., on July 1st.

—The Village Council of Fairview, Mich., recently appointed Mr. Peter Fecteau street commissioner and Mr. Fred Saas, marshal.

—Mr. A. A. Fenn has been appointed City Treasurer of Leavenworth, Kan., to fill out the unexpired term of the late O. C. Beeler.

—Mayor Capdevielle, of New Orleans, La., has appointed Patrick McGrath to be City Treasurer in place of George B. Penrose, who recently died.

—Hon. Robert M. Love, State Comptroller of Public Accounts of Texas, was shot and killed in his office by a former clerk whom he had discharged.

—At a meeting of the Council of Canton, N. J., in June, City Engineer Farnham was formally placed in charge of the water department and an assistant engineer was named to help him in his work.

—At a regular meeting of the City Council of Bristow, Va., the following were elected for the coming year: Street and water commissioner, Col. Frank Collmon; city attorney, J. S. Ashworth; clerk of the council, John H. Gose.

—On the 18th of June the new city administration of Jacksonville, Fla., was inaugurated. The new officers are: Mayor, Judge George M. Nolan; recorder, W. C. West; treasurer, A. M. Ives; comptroller, Charles Verelst; marshall, D. A. Williams.

—By a vote of eight to one, the Common Council of Mt. Vernon, N. Y., removed Commissioner of Public Works John O'Toole from office under charges of malfeasance and nonfeasance. The Commissioner will probably carry the case to the courts.

—Mayor Jeffrey, of Columbus, O., is in favor of taxing the farmers who use the city streets to compete with local tradesmen. He thinks that if a farmer uses the streets regularly to do business in competition with the city merchants, he should be taxed as well as they.

—Mr. Joseph W. Hunter, of Jenkentown, Pa., has been appointed by the Governor as public State Highway Commissioner under the new law. He will direct the improvements of roads throughout the Commonwealth for which $6,000,000 were appropriated by the last legislature.

—On June 25th Mayor Paul Capdevielle, of New Orleans, La., turned the first spadeful of earth in the work of constructing the last system of sewerage that is to make New Orleans one of the most healthy of American cities, and which is to cost in the neighborhood of $18,000,000.

—The salary of the Hon. O. Z. Henderson, mayor of Anniston, Ala., has been reduced by the City Council from $100 to $50 per month. The Mayor formerly filled the position of recorder, but upon the election by the Council of another person to that position, the Council did not feel it could afford to pay the Mayor the double salary.

—City Secretary S. A. Moore, of Dallas, Tex., was killed by his second son while threatening to kill his youngest. Moore was under the influence of liquor and had been for some time and had become violent towards his family. When he laid violent hands on his youngest son, his second son, fearing his brother would be killed, fired two shots at his father, instantly killing him.

—The contest over the question as who was entitled to the office of mayor of Ithaca, N. Y., has been settled by the Supreme Court in favor of Mr. George W. Miller. After the election last fall, the vote was declared a tie, but on opening one of the voting machines, it was found that Miller had seven more votes than was accredited to him. In the dispute over the matter, the case was taken to the Supreme Court.

—Mayor John Edwards of Granite City, Mo.,. died on June 17th as the result of injuries sustained at the Levee pumping station while trying to save the city when a flood first threatened it. On June 3rd Mayor Edwards, with three citizens, hurried to the pumping station to start the pumps, which are run by gasolene. The Mayor entered the building alone and lighted a lantern when there was an immediate explosion with the result that His Honor was severely burned. The Mayor had been in office but two months and was only thirty-three years of age.

—Ex-Mayor James G. Bailey, of Scranton, Pa., admitted on the witness stand that he had been bribed to sign an ordinance in which the Barber Asphalt Company was interested, receiving $1,000 for his part. This came out at the trial of Mr. W. W. Scranton, President of the Scranton Water Company, for criminal libel, Councilman W. W. Finn having brought the charges against Mr. Scranton. Mr. Scranton, to prove his allegations regarding Mr. Finn, summoned an agent of the Barber Asphalt Company and Mayor Bailey, who swore to the above confession.

—Councilman Cuvellier, of Oakland, Cal., is very much interested in the question of salt water sprinkling and considers that the experiments made in that direction have been a success. He has been advocating the idea for many years, but not until the present administration was he able to secure the co-operation of the Council to bring about the end sought. The people upon whose streets salt water has been sprinkled are greatly pleased with the results obtained. City Engineer Turner lately completed an estimate for a system of a salt water sprinkling plant, and experiments are being carried on to thoroughly test the idea.

—Chief Engineer William R. Hill of the New York Aqueduct Commission has resigned. Mr. Hill has been ill for a long time and had received a leave of absence on account of his disability, but a year's rest had not enabled him to regain his strength and so he tendered his resignation. Mr. Hill was appointed chief engineer on January 1, 1900, having resigned from the position of chief engineer of the Syracuse water works to accept the office in New York. He will probably go to Denver for his health as he is suffering from a pulmonary complaint as well as from heart trouble. He will probably become the advisory engineer of the water supply department of Denver.

Guarding the Health of Lowell

Tuberculosis was added to the list of dangerous diseases by the health department of Lowell, Mass., last year, and the department required the fumigation and cleaning of premises after the death or recovery of any such case, and, in addition, required that physicians report such cases to the department whenever they were met in practice.

In its annual report, the board of health appeals to the public to sustain it in its work of regulating the water supply, garbage disposal, plumbing, drainage, etc., of the city which fall under its jurisdiction. Many landlords are grateful for the improvement of their property that accompanies the abatement of nuisances, while others are averse to inspection. Prevention costs less than cure, and any work that tends to arrest the progress of disease should have the good will of all.

The report to the board by Bacteriologist Smith showed that there were only 7.2 per cent. of deaths in cases of diphtheria where antitoxin was used, and 24.5 per cent. of deaths where no antitoxin had been employed. The milk supply in certain quarters was found responsible for many cases, and a careful following up of these located the parties responsible for the trouble, and temporary suspension of the supply from the dealers at fault stopped the spread of the disease. It is believed by many authorities that from 8 to 50 per cent. of well persons are infected with diphtheria and are capable of transmitting the disease to others more susceptible. Therefore, well persons so infected should be warned to take proper precautions. The department keeps an exhaustive history of every case of contagious disease reported, and so can stop the spread of the trouble.

In regard to smallpox epidemics, the board repeats the statements contained in an address before the American Medical Association at Chicago, in which the question of successful vaccination was mentioned. It stated that many physicians do not know what constitutes a successful vaccination, and many are mystified by cases of smallpox in subjects that were "vaccinated" by them a short time before.

The board compares its city with Lawrence, typically situated, and shows how the filtration of the water supply saved the latter city from typhoid epidemics, while Lowell had an almost continuous epidemic of this disease for years. A system of driven wells being installed, however, immediately lowered Lowell's death rate.

Cost of Paving Brick Pavements

BY JOHN B. M'GARRISH*

I HAVE been asked to prepare a paper on brick—presumably because I have been a manufacturer for some years. I have no information to give you about how to work the clay, how to operate machinery, how to dry brick, how to burn them, how to water smoke, how to get colors, how to keep clay from cracking or warping, the kind of machinery to use, the kind of kiln to use, how to prevent brick wheelers from mutilating the brick, nor how to burn them 100 per cent. hard.

We try to make all pavers, but I am sorry to say we do not get over 60 per cent. pavers. On account of wet weather and higher wages the cost of our brick this year over last is about 20 per cent. Our yard last year employed union labor only, which may have caused part of the increased cost, but not all, for the reason that labor was well employed everywhere and laborers would necessarily demand better compensation. The Clay Workers' Union are going to demand an eight-hour day and 25 cents per hour. Last year they had a nine-hour day and 20 cents per hour. This is an advance of 25 per cent. on labor over last year, and increased cost of $1.19 per thousand. There will probably be an advance of at least 50 cents per ton on coal, which means another 50 cents per thousand increased cost, making a total increase of $1.69 per thousand, which, added to $8.00, the cost last year, would make the cost this year $9.69 per thousand at our plant.

When I started in the brick business I was assured that I could make brick for $3.00 per thousand, and even now I am told that other people make them for $4.00 per thousand. I am here without a lantern, but I am looking for the man who can do this, and hope he will be able to tell me how to make brick cheaper.

We have had some experience in laying paving and believe the cost in the average city of Iowa to be as follows, per square yard: Brick, 68c.; freight, 12c.; concrete, 42c.; grading, 8c.; labor (laying brick), 6c.; labor (hauling brick), 7c.; sand for cushion and filler, 6c.; total, $1.49.

A vitrified brick pavement, properly laid, will last 25 years or more. The first brick pavement in Iowa, laid with inferior brick on poor foundation, has been down sixteen years without a cent having been expended on it other than the first cost. The property holder cannot be assessed for repairs to paving, so that when paving wears out or rots it must be relaid new and then the cost is again assessed to property. The average life of a cedar paving is seven years, and is rapidly going out of use as a paving material. This leaves asphalt as the only competitor of brick in Iowa, and as I have had some experience with it, I will tell you what I know about it.

The constituent parts of the wearing surface of an asphalt pavement 1½ inches thick is as follows, per square yard: Asphalt, 21; sand, 180; limestone dust, 12; oil, 4.

From this you will see that 84 per cent. of this pavement is sand, less than 10 per cent. asphalt, and when the oil evaporates you will have nothing but a dead mass of sand. The asphalt mostly used is "Trinidad Lake refined asphalt," and analyzes as follows: Bitumen, 55.6 per cent.; impurities, 44.4 per cent.; total, 100 per cent.

From this you will see that in a yard of paving top there is really but 5½ per cent of bitumen. The actual cost of this pavement is as follows: Guaranteeing, 25c.; concrete, 42c.; grading, 7c.; binder, 15c.; top, 65c.; promotion, 15c.; total, $1.69.

But they seldom bid less than $2.00. The Audit Company, of New York, in investigating the books of the Asphalt Trust, for the receivers, found large expenditures under the head of "Promotion as Disclosed on the Books," and explained it in the following paragraph, viz.: This caption was selected by us to cover all incidental expenses involved in the securing and making of private contracts, such as commissions, advances, salaries, etc.

Where 1,000,000 yards are let with a promotion fund of 15 cents per yard, the amount would be $15,000.00. This would be a great temptation to unprincipled property holders, but might not influence the aldermen.

Asphalt paving can be summed up to be costly, first, last and all the time. Like a silk dress, it does not last long enough, under continual wear and atmospheric conditions, to be economical.

Brick gutters are generally laid even when asphalt is used, on account of the rapid disintegration of the gutter. Street car tracks are laid with brick because the companies find asphalt too short-lived and expensive. When it commences to disintegrate or rot it goes rapidly. A paving assessment every few years may not be too much for high rental property in New York, but in our Iowa cities it is a great burden and sometimes confiscation of property.

The Asphalt Paving Trust is now in the hands of a receiver, and the bond company guaranteeing their work have many loopholes to crawl out of when called upon to repair defective pavements. This fact ought to make property holders careful about adopting this paving. Asphalt pavement employs foreign labor, while brick employs home labor. Asphalt repairs must be done by imported experts, while any citizen can repair brick pavement. In brick paving we are handling material placed here for our convenience, and in asphalt we are handling a material placed in South America, a totally different climate. I am in favor of letting it stay there, thus preventing the cheap South American labor from competing with our well-paid Iowa labor. Let us ask our Iowa senators and representatives to protect home manufacturing and development by placing a duty on imported asphalt, the same as any other imported luxury. If protection is a good thing for eastern manufacturers an extension of it to western industries would be unusual but welcome.

When we need asphalt, we could develop the numerous deposits we have in this country, which chemists say are far richer in bitumen than the Trinidad asphalt.

* Mr. McGarrish is a prominent brick manufacturer of Des Moines, Ia., and was asked to prepare this paper, which he read before the recent meeting of the Iowa Clayworkers' Association.—[EDITOR].

Water Meter Rates in Iowa Cities and Towns

	Population.	Min. daily amount charged; gallons.	Meter rates per 1,000 gal.; cents.	Max. daily amount charged; gallons.	Meter rate per 1,000 gal.; cents.	Min. yearly rate.
Ackley z	1,445	500	40	1,000	20	$5
Algona z	2,911	500	40	1,000	20	6
Anamosa	2,891	133	40	266	20	6
Atlantic z	5,046	1,000	40	5,000	20	5
Bloomfield z	2,105	33	60	1,000	30	...
Boone z	8,880	833	15	13,333	10	...
Burlington z	23,201	1,000	40	5,000	20	...
Cedar Falls z	5,319	100	30	1,000	15	...
Cedar Rapids z	25,656	3,333	25	16,666	8	b 12
Centerville	5,256	100	50	4,000	15	...
Charles City z	4,227	500	40	1,000	20	...
Clinton	22,698	1,000	30	8,000	10	6
Council Bluffs	25,802	100	35	4,000	15	...
Davenport	35,254	6,666	40	21,000	10	12
Denison z	2,771	333	40	16,000	* 20	4
Des Moines	62,139	1,000	30	5,000	10	4
Dubuque	36,297	1,000	50	100,000	20	...
Eldora z	2,233	100	40	1,000	15	...
Emmetsburg z	2,361	100	35	1,500	* 20	...
Esterville z	3,237	1,666	40	333,333	10	...
Ft. Dodge z	12,162	28	50	16,466	8½	a
Ft. Madison	9,278	333	50	1,666	20	6
Grundy Center z	1,322	100	40	1,000	20	...
Hampton	2,727	200	30	3,000	8	...
Humboldt	1,474	100	40	15,000	15	...
Iowa City	7,987	100	40	1,000	20	...
Jefferson z	2,601	200	40	5,000	25	...
Keokuk	14,641	1,666	40	2,666	9	...
Knoxville z	3,131	16	20	16	15	6
McGregor z	1,498	500	40	5,000	* † 14	...
Manchester z	2,887	500	30	1,000	20	5
Marion	4,102	100	40	1,000	20	...
Marshalltown z	11,544	333	40	500,000	|| 7½	4
Mason City z	6,746	22	50	2,745	¶ 10	4
Missouri Valley z	4,010	500	30	4,000	10	10
Monticello z	2,104	500	40	1,000	20	...
Mt. Pleasant	4,109	533	50	33,333	8	...
Mt. Vernon	1,629	1,000	30	1,000	20	...
Muscatine	14,073	100	40	2,000	25	...
Red Oak z	4,355	500	25	5,000	* 11	...
Waterloo	12,580	500	40	1,000	* 20	...

* Over this amount, special rates are given. In Waterloo this rate is regular, with special rates for large amounts. † 10 per cent. discount for prompt payment. || 20 per cent. discount for payment within 15 days for amounts over 3,000 gal. per quarter. ¶ Whole system metered. a If less than 2,000 be used in six months, 50 cents is charged for meter inspection. b When company furnishes meter; if consumer furnish it a minimum rate of 25 cents a month is charged. z Municipal plant.

American Water Works Association

THE twenty-third annual convention of the American Water Works Association, held at Detroit, Mich., June 23rd to 26th, was a rousing success. More than four hundred members and their friends were in attendance. Taken as a whole it was the most helpful meeting which has been held in many years, a result largely due to the efficient services of Secretary Diven.

The publishing of the papers in advance of the convention permitted their reading by title only and so gave much more time for their discussion and for the transaction of business. Naturally the delegates enjoyed the entertainment accorded them by their host and all departed with the conviction that Detroit had sustained its well-earned reputation for liberal hospitality.

The secretary-treasurer gave the total membership as about four hundred, with an aggregate income of three thousand dollars, and presented the applications of seventy persons for membership.

The association passed an important resolution providing that technical periodicals publishing matter relative to the association and its proceedings, or republishing papers read before it, be allowed one representative in the active membership grade without dues, and granted one page of advertising in the annual proceedings without charge.

Eleswhere in this issue will be found the paper on "Fire Protection Water Works," by Nicholas P. Simin, Chief of the Water Works of Moscow, Russia, which is the only paper we are able to publish in this issue owing to lack of space.

The association accepted the invitation from St. Louis and the next convention will be held in that city.

The following officers were elected for the ensuing year: President, Mr. L. M. Case, Duluth, Minn.; First Vice-President, Mr. M. R. Sherrerd, Newark, N. J.;Second Vive-President, Mr. T. H. Bennett, Oswego, N. Y.; Third Vice-President, Mr. C. E. Rowe, Dayton, O.; Fourth Vice-President, Mr. B. C. Adkins, St. Louis, Mo.; Fifth Vice-President, Mr. A. A. Tucker, Memphis, Tenn. Mr. J. M. Diven, of Elmira, N. Y., was re-elected secretary and treasurer.

Municipal Tramways for London

AT last London, (Eng.), is to have electric tramways run under municipal ownership—that of the London County Council. This places London on a footing with the other large cities of England and the Continent and, while but a portion of the proposed traction scheme has been completed, it will be the entering wedge that will no doubt result in municipalizing all London railways. Some papers are already finding fault with the road, claiming that a blunder was made in installing the underground trolley, especially in wide suburban thoroughfares, in place of the overhead trolley, because the income would not be sufficient to pay the expense of installation and maintenance.

In 1896 the North Metropolitan and London Street Tramways companies transferred their undertakings to the Council and the latter secured the services of Dr. A. B. W. Kennedy to give expert advice. After a tour in America he reported in favor of the underground trolley. In 1900 Parliament granted the Council power to use electricity on the roads. In February, 1901, the estimates amounting to $3,117,500 were approved, but changes in the plans brought the amount up to $4,907,485. It has been calculated that the profits of electric traction over horse-power will aggregate about $125,000 a year, but others declare that the cost of the work—$134,175 a mile—will preclude the possibility of profitable operation.

The new road is double-tracked and the rails are of the girder type and weigh 102 pounds per yard. A current of 500 volts pressure will be used. Dr. Kennedy supervised the whole of the work and Mr. J. H. Rider, the electrical engineer of the Council, looked after the electrical portion. The work has been well done and the equipment is of the best. In addition to the lines just opened, nineteen and one-fourth miles in South London will be rebuilt and equipped by the Council, the estimates amounting to $4,091,350 having been approved in December, 1901. About three miles in addition will also be undertaken at a cost of $665,000. The overhead trolley may be used in some sections if the borough councils give their permission.

How Georgia Taxes Franchises

THE general assembly of the State of Georgia recently passed an act providing for the taxation of all franchises held within the State. The sections provide as follows:

"SEC. 1. Be is enacted by the Senate and House of Representatives of the State of Georgia in General Assembly met, That the term "special franchise," as used in this Act, shall include every right and privilege exercised within this State granted to any person, partnership or corporation by the State or its authority, or by any county or county officer, or officers, or any municipal corporation or officer thereof, for the exercise of the power of eminent domain, or for the use of any public highway or street, or the land above or below any highway or street within the limits of said State, and every special right exercised within this State granted by charter, resolution, by-law, statute or otherwise, whether under the laws of this or any other State, for the exercise of any public service, such as the construction and operation of railroads equipped for steam, electricity, horse-power, compressed air, or otherwise, for the common carrying of passengers or freight; the construction or operation of any plant or plants for the distribution and sale of gas, water, electric lights or power, steam heat, refrigerated air, or other substances by means of wires, pipes or conduits made under or above any street, alley or highway, or the construction and operation of any telephone or telegraph plant; all rights to conduct wharfage, dockage or cranage business; the conduct of any express business or the operation of sleeping, palace, dining or chair-cars; all rights and privileges to construct, maintain or operate canals, toll roads or toll bridges; the right to carry on the business of maintaining equipment companies, navigation companies, freight or passenger depots, and every other like special function dependent upon the grant of public powers or privileges not allowed by law to natural persons or involving the performance of any public service, not including the mere right to be a corporation by trading or manufacturing, or other corporation exercising no special franchise above enumerated.

"SEC. 2. Be it further enacted by the authority aforesaid, That on or before the first day of May in each and every year, ever person, partnership or corporation holding or owning and exercising any special franchise or franchises within the State of Georgia, shall make a special return, sworn to by such person or member of such partnership, or by the president, vice-president or secretary of such corporation to the Comptroller-General, stating the value of said franchises as exercised within the State, and particularly describing the same, accompanying said return with a certified copy of every statute, ordinance, resolution, contract or grant under and by authority of which said franchises are held, claimed or owned; provided, nevertheless, that where such certified copies have once been filed with or returned to said Comptroller-General, it shall not be necessary in any subsequent annual return to duplicate the same, but the same shall be considered returned by reference to the copies filed as required by this section." Section 8 imposes double taxes on any failing to make return of such franchises, the Comptroller-General to assess the value and certify as in Section 6.

"SEC. 3. Be it further enacted by the authority aforesaid, That the Comptroller-General shall not be bound to accept the valuation assigned to such franchises in the return made, but it shall be his right and duty to review the same, and in case of his refusal to accept the return, the subsequent proceedings shall be in all particulars the same as are now provided by law in the case of his refusal to accept the terms made by railroad companies of their physical property, and said franchises shall be taxed at the same rate as other property upon the value thereof as returned, or if the value returned is not accepted, upon the value as above ascertained, the said tax to be levied and collected as now provided in case of the property of said railroad companies.

"SEC. 4. Be it further enacted by the authority aforesaid. That in the cases of all special franchises exercised beyond the limits of one municipality or county, as in the case of telegraph or telephone lines, or railroads or steamboats, the return provided for in the second article shall show the number of miles over which said railroad or telegraph, or telephone franchise, or other special fran-

chises, are exercised in each county and in each municipal division within said State, in like manner as railroad companies now make returns of their physical property."

"SEC. 6. Be it further enacted, That the Comptroller-General shall certify to every municipal corporation and the taxing authorities of every such county the name of every special franchise taxable within such municipality or county, and the amount of taxes due on the same to such municipal corporations or county as now provided by law in the case of railroads."

Section 5 provides that the valuation for taxation of such franchises is to be apportioned to each county and municipality in which it is exercised as is apportioned the personal property of railroads.

Section 7 states that taxes due on such franchises shall be collected as in the case of other taxes due from railroads.

Section 9 provides that no franchise that is not enumerated in the preceding sections shall be exempt from taxation, but shall be returned and taxed as other property under the present laws.

Wood Paving in Newcastle

MAJOR C. E. NORTON, R. E., Local Government Board Inspector, recently held an inquiry into the application of the City Council for power to borrow £30,000 for works of wood paving. The council was represented by Councillor John Beattie, chairman of the Town Improvement Committee, Mr. Hill Motum, town clerk, and Mr. F. J. Edge, city engineer.

The town clerk stated that the estimated population at present was 219,021. The ratable value was £1,321,047. The loans under the Public Health Act were £185,087, and under the Local Acts, for sanitary and other purposes, £1,199,500. The present application was for wood paving, and they desired that the repayment should be for as long a period as possible. The corporation had, for some years, paved some of their streets out of revenue. They had spent about £6,000 annually for that purpose; but the revenue was not sufficient to meet the expenditure on all the streets they desired to pave. They could not contemplate the payment of £30,000 out of revenue, and, therefore they thought they had better borrow for the purpose, with repayment over a term of years. The number of superficial yards to be paved was 29,980, and the estimated cost was £1 per yard. The streets were all public highways, but, except one or two, they were not thoroughfare streets, and there was not much traffic on them. They had already paved a number of the main thoroughfares out of revenue. In the streets they proposed to pave out the loan, the traffic would not be so heavy or so frequent as upon the streets they had already paved.

The inspector said that, some little time ago, the Local Government Board, in granting loans for wood pavement, made the period of repayment ten years or five years, according as it was hard wood or soft wood. They had, however, come to the conclusion that a longer period was desirable, because a greater proportion of it consisted of good concrete foundation, and for such foundation an extended period should be given. The corporation proposed to spend upon excavating foundations, £1,497, and they would get 30 years for that; upon concrete foundations, £7,120, for which they would get 20 years; and for wood paving £19,000, for which they would get ten years; and for gulleys and connections £705, for which they would probably get 30 years.

Mr. Edge, city engineer, said he had recently taken up some pavement that had been down eleven years. That was soft wood, and it would have lasted three or four years more, but he only took it up because the streets were being repaved in connection with the tramways. Hard wood would last much longer. Some of the wood that had been taken up would be used in repairing other streets.

Newgate street and Percy street were in very bad condition indeed. There was no concrete foundation, and the setts were irregular in size—"random" setts. They were principally Northumberland Whinstone, mixed with granite chips. The same applied to Clayton Street West. Osborne Road, in respect of which the application was for only one side, was a suburban road, with a tramway up the middle, and one side was already paved. They were widening the road, in which, at present, the tramway ran very near the kerb, and the existing paving was very bad. Blackett street, up which the tramway ran, was paved with granite setts, and was better paved than the others; there being wood paving between the tramway rails. New Bridge street was badly paved, in the same way as Percy street, with granite and whin setts; and so bad had this become that he had been obliged to have the work done. Saville Row, Saville Place, and Ellison Place were all continuation of the same street, and were at present paved with tar macadam, originally laid down some five years ago, and was continually being repaired. The traffic was very much increasing in these streets, and tar macadam was no longer suitable pavement for them.

Some of the soft wood pavement had been down for eleven years. Of hard wood their experience had extended only over three years, and they found that there was very little wear.

The inspector said the Board would like to be informed what advantage the corporation believed to lie in wood paving over other paving.

The town clerk said there was a great desire throughout the whole city that the principal streets should be paved with wood; and these were the streets which the council considered should be paved first. The residents desired wood paving, and, if the council had given way to the demands made upon it, the application would have been for a sum very much larger than £30,000. These were only a selection of a large number of streets which were on the list of the Town Improvement Committee, which they considered ought to be, and which, probably, in time, would be paved with wood.

Asked as to whether allowance had been made for old material, the engineer said that no credit had been given for that, because it would only be useful for breaking up. They had a quantity of wood in hand, for which tenders had been obtained. They had about half the amount required; and the rest would be obtained by tender. The wood they had was being seasoned. It was stated that the corporation had spent on wood paving, out of revenue, since March 25th, 1899, £27,200.

The inspector, having concluded his preliminary inquiry, drove round the streets it is proposed to pave with wood, and made an inspection of them.

Water Rates in Allegheny

THE ordinance levying taxes for 1903 in the city of Allegheny, Pa., contains the following rates for the use of water: One room, $2.50; two rooms, $4.00; three rooms, $5.75; four rooms, $7.25; five rooms, $8.75; six rooms, $10.25. Houses containing more than six rooms shall be assessed an additional $1.50 per room; large rooms (equal in size to two common rooms) shall be assessed as two rooms; elevators, hotels, taverns, boarding houses, drinking saloons, and all places where steam is used shall be charged special rates, to be fixed by the committee on public works, except when supplied by water measure, then the rate shall be one (1) cent per hundred gallons; a further rate, exclusive of any rate that may be charged by the foregoing, on the following items, viz.: Public baths, each tub, the sum of $10.00; private baths, each (cold water), $2.00; (hot and cold water), $3.00; water closets, public and private, not less than $2.00 nor more than $10.00; private dwellings, each additional closet, half rates; plug hand wash basins, each, $1.50; carriages, omnibuses, buggies, etc., $2.50 to $10.00; horses, each $1.50; cows, each 75 cents; slaughtering houses, each from $10.00 to $50.00; storerooms, separate and apart from dwellings, from $2.50 to $10.00; hydrants, or any other arrangements (separate from hydrants in common use) for washing pavements, from $1.00 to $10.00; and garden or lawn hose, from $2.50 to $12.00; saloons, from $15.00 to $40.00, where pumps are used, each $5.00 additional; barber shops, one chair, $5.00, for each additional chair used, $3.00; blacksmith shops, each forge $2.00; churches, from $3.00 to $7.00; schools, from $5.00 to $25.00; offices separate from dwellings and stores, $2.00; bakeries, for each barrel of flour baked, 1 cent; fountains in yards or gardens, a jet of three-sixteenths (3/16), $5.00, each additional jet, $2.00; brick yards, for each 1,000 bricks made, 10 cents. All the above indefinite assessments to be made at the discretion of the superintendent of bureau of water assessments.

Oil on Troubled Roads

THE U. S. Department of Agriculture has reviewed, in its annual report, the use of oil for laying the dust on roads and streets. It refers to the use of oil by California municipalities and states that the growth of oil in popular favor has been steady and rapid. It has been several years since oil was first tried on streets to lay the dust and, while other cities have made more or less successful attempts to use oil, the California cities have succeeded well and have specifications for the treatment of roads with oil. One of the long stage roads was oiled last winter for a distance of seventy miles. The oil and dust form a paste that is forced into the ruts and helps to keep the road in good condition. The large sums spent by cities on sprinkling the streets with water could be saved in part by using oil to lay the dust. From two to three sprinklings with oil the first year and a single application in succeeding years is all that appears necessary to keep down the dust.

The city of Bakersfield, Cal., has adopted the following specifications for the building of oiled streets, as prepared by City Engineer Evans:

First—The street, after being graded in accordance with specifications for grading streets in city of Bakersfield will be ready to receive the oil.

Second—The quantity of crude mineral oil to be applied shall be at the rate of one and one-half gallons of oil per square yard of surface area of street.

Third—The oil shall be 12 to 14 Baume gravity and containing not over 2 per cent. of water and heated to a temperature of not less than 200 degrees Fahrenheit when being applied.

Fourth—The oil shall be applied as follows: The streets shall be plowed to a depth of six inches, then be coated with oil at the rate of one gallon of oil per square yard of area; then the oil shall be plowed under to a depth of four inches and then harrowed with a disc harrow, or rolled with a Fitzgerald spike roller; then a second coating of oil shall be applied at the rate of one-half gallon of oil per square yard of surface area of street. The street shall then be harrowed or rolled with the Fitzgerald spike roller till the oil becomes thoroughly incorporated with the surface material of the street. Then the street shall be rolled till sufficiently compacted to withstand ordinary traffic without rutting.

Fifth—When accepted, the street shall be on the established grade, having a true and even surface and crown.

Sixth—The contractor shall furnish all material and appliances necessary for the prosecution of the work to completion in a thorough and workmanship manner.

Seventh—Bids shall state price per barrel (42 gallons) of oil applied on street according to the method prescribed in these specifications.

Eighth—The work shall be performed under the superintendence and to the satisfaction of the street superintendent and city engineer.

Estimates have placed the cost of treating a mile of road for three years at not to exceed $200, of which about one-half would be spent the first year. In Fresno, Cal., an average of 75 cents a barrel is paid for oil. For one mile, 125 barrels are needed the first year, and from fifty to seventy-five for the second and third years, while the cost of sprinkling with water has amounted to $700 annually. The use of shell and oil has been tried in Galveston, Tex., with good results. The two united to form a fairly durable and a dustless pavement.

Oiled roads have been tried in England, the oil being sprinkled on the road from watering carts. In Newmarket a gallon of oil was allowed to each square yard of road, and one application sufficed to lay the dust all summer, the cost amounting to about 1 cent per square yard. Three-quarters of a mile of dusty road near Aldershot was sprinkled with heavy Texas petroleum. One good soaking was all that was necessary, the oil forming a tough, leather-like surface on the road that cured the dust evil and helped to preserve the road. Experiments were made on other roads with equal success.

In Bombay, India, oil was sprinkled on one of the main roads. Two applications were necessary, although the quality of the road was not of the best. Rain appeared to soak in the road, and the road did not dry out so quickly as portions not treated with oil. This, however, should be an advantage. A heavier oil than was used would not have soaked into the road material so rapidly.

Experiments made by Dr. Guglielminetti, of Monte Carlo, for oiling or tarring roads about Champigny were very successful. The road was well rounded and cleaned of all dust, laying bare the macadam. Hot tar was spread over the road in a very thin layer and fine sand was sprinkled over this before it cooled. After six weeks the surface proved to be non-slippery, extremely hard, even in hot weather, and the rain had no apparent effect, running off rapidly into the ditches. The cost amounted to about 1 cent a square yard. Other experiments were made with a mixture of tar and scoria, which was rolled with heavy rollers and rendered the surface impervious to water and prevented all trouble from dust.

How to Lay Brick Sidewalks

How the city of Quincy, Ill., lays its brick sidewalks may be of interest to other municipalities, and the following method is given: The specifications provide that before the sidewalk is laid the ground must be excavated and graded eight and one-quarter inches below the upper surface of said walk. On the earth road bed thus formed a bottom layer of cinders must be laid to a uniform depth of four inches, and must be well tamped. When so tamped the upper surface of the cinders must be parallel with, and four and one-half inches below, the proposed upper surface of the walk. Upon this layer of cinders must be spread a layer of clean, sharp river sand to a depth of two inches. The upper surface of the sand must be parallel and two and one-quarter inches below the proposed surface of the walk, and upon this layer of sand is to be placed one course of hard burned brick laid upon the flat surface herringbone fashion. The brick must be regular in shape and size, and shall be 2¼ x 4 x 8½ inches. No broken or irregular brick shall be used except that necessary to break joints. All the crevices between the bricks shall be well filled with clean, dry river sand.

Treatment of Pavements

They took a little gravel
  And they took a little tar
With various ingredients
  Imported from afar.
They hammered it and rolled it
  And when they went away
They said they had a pavement
  That would last for many a day.

But they came with picks and smote it
  To lay a water main;
And then they called the workmen
  To put it back again.
To run a railway cable
  They took it up some more;
And they put it back again
  Just where it was before.

They took it up for conduits
  To run the telephone;
And then they put it back again
  As hard as any stone.
They took it up for wires
  To feed the 'lectric light,
And then they put it back again,
  Which was no more than right.

Oh, the pavement's full of furrows;
  There are patches everywhere;
You'd like to ride upon it,
  But it's seldom that you dare.
It's a very handsome pavement;
  A credit to the town;
They're always diggin' of it up
  Or puttin' of it down.

—*Washington "Star."*

Newark to Have Bitulithic Pavement

It is proposed by the property owners of Osborne Terrace, Newark, N. J., to lay bitulithic pavement on that street. A special committee, appointed by the property owners, recently visited Yonkers to inspect the bitulithic pavement laid in that city, and made other investigations as to the comparative value of pavements in general, and has issued the following report:

"In compliance with the motion passed at a meeting called to consider the advisability of petitioning the Board of Street and Water Commissioners for the laying of a pevement on Osborne Terrace, the members of your Special Committee report, that in accordance with the wish expressed, they have investigated the question of pavements, their cost, relative merit, etc.

"We inspected the pavements laid in Yonkers, of which we found about two miles. We found it laid through a section of the city, lined on either side with handsome, costly residences.

"The avenues on which it was laid had steep grades, many of which were fully as steep as that on the Terrace and some even greater, the average width of which were twenty-four feet between curbs.

"The pavement had all the appearance of a well-kept telford road, but free from the dust annoyance common to telford. The pavement we found to be more noiseless than brick or asphalt; it is elastic and gritty and presents a safe and sure footing for horses, as claimed for it.

"The surface covering of chip stone, when traveled over makes a hard, firm and clean looking road. Beneath this surface we found a hard and apparently durable foundation of solid stone, bound together with flexible bituminum of a consistency which will withstand the effects of heat and cold. In some few spaces near the curb we found places where the bituminum was evident on the surface, but did not appear disagreeably soft or sticky, or in such quantities as to be objectionable. The reason ascribed for its appearance was, that the curb was of so shallow a depth that it would not permit of the passage of the fifteen-ton roller used in laying this pavement, being run within one foot of the curb line.

"Even on the steepest grades we found no place where the rain had washed away the top of the pavement. At one place where a hydrant had been frequently flushed, the stream of water which you all know issues from each flushing, showed no other effect upon this pavement than that of washing off the thin layer of chip stone.

"Your committee was very favorably impressed and concluded that in all human judgment it would prove to be a good and lasting pavement for the Terrace."

How Norfolk Regulates Width of Streets

A letter from City Engineer Brooke, of Norfolk, Va., to Chief Engineer Hazlehurst, of Mobile, Ala., tells how the width of the streets in the former city is regulated. The ordinance, which has been in force for some time, provides that in all streets forty feet wide between building lines, and paved, the sidewalks shall be ten feet wide; streets having a width of fifty feet must have twelve-foot sidewalks, and those of sixty feet, a fourteen-foot walk. All streets between forty and sixty feet wide not of the widths given above must have sidewalks in proportion to the width of those specified. The effect of the ordinance is to give twenty-foot roadways on streets forty feet wide; twenty-six-foot roadways on fifty-foot streets, and thirty-two-foot roadways on sixty-foot streets. On the streets that are over sixty feet in width, the City Engineer has built roadways of twenty-seven-foot width, using the rest of the street for walks near the building lines and parking the remaining portion. The advantages of this plan are given as follows: First, a reduction in the number of square yards of paved surface to be cleaned and maintained; second, the opportunity to pave more miles of streets with the funds in hand; third, a space where trees may be planted with opportunity for obtaining moisture sufficient for their growth; fourth, a pleasing effect, due to the bordering of the roadway with trees and grass. City Engineer Brooke says that there is a tendency to modern cities to narrow the roadways, especially in residence streets, from twenty-seven to thirty feet being all that is necessary for traffic. On a street fifty feet wide he recommends not more than a twenty-four-foot roadway, with a six-foot grass strip and seven-foot sidewalk.

Statistics of Arc Lighting in United States Cities and Towns

	Population.	No. lamps. Open.	No. lamps. Closed.	Watts at lamp terminals. Open.	Watts at lamp terminals. Closed.	Schedule.	Hours burn per year.	Coal, per ton.	Contract price per lamp per year.
Ovid	1,293	24	...	480	...	.....	650	$2.55	$50.00
Owasso	8,696	106	12	480	430	(1-2-3)	2,179 / 1,625	1.85	90.00 / 60.00
Paw Paw	1,465	58	...	480	...	(1)	1,825	W. P.	z
Petoskey	5,285	...	38	...	...	(1)	3,240	3.00	z
Plainwell	1,318	...	20	...	550	(2)(3)	1,825	W. P.	50.00
Pontiac	9,769	125	...	480	...	(2)(3)	2,130	2.50	57.50
Port Huron	19,158	10	250	340	480	.....	2,200	2.50	70.00
Portland	1,874	37	...	480	...	(2)(3)	1,200	W. P.	60.00
Rochester	1,535	...	18	...	...	(2)(3)	1,203	...	60.00
Royal Oak	468	...	15	...	...	(2)	2,600	Gas	73.00
Saginaw	42,345	...	263	...	480	(1)	3,800	2.25	65.00
St. Clair	2,543	... / 40	23	...	480	.....	1,825	...	42.00
			...	480	...	(2)	2,179	2.47	z
St. Johns	3,388	43	...	340	...	.....	1,200	...	72.00
Sault Ste. Marie	10,538	...	80	...	430	(1)	4,000	W. P.	50.00
Shelby	1,081	17	2	340	...	(2)	2,179	2.10	z
Tecumseh	2,400	42	...	340	...	(1)	4,000	2.15	58.00
Three Oaks	994	15	...	480	...	(2)(3)	1,220	2.50	z
Three Rivers	3,550	52	...	480	...	(2)(3)	1,220	2.75	53.00
Vicksburg	972	21	...	340	...	(2)(3)	1,220	3.00	50.00
West Branch	1,412	30	...	480	...	(1)(2)	2,179	W. P.	40.00
Williamston	1,113	19	...	480	...	(1)(2)	1,220	2.40	60.00
MINNESOTA									
Adrian	1,258	...	16	...	550	(2)(3)	1,220	5.65	72.00
Alexandria	2,681	11	...	340	...	(2)(4)	2,100	Wood	z
Anoka	3,769	25	...	340	...	(2)(4)	1,550	4.00	84.50
Appleton	1,184	...	9	...	...	(2)(3)	1,000	3.25	z
Blue Earth	2,900	...	12	...	550	(2)(3)	1,350	3.50	40.00
Breckenridge	1,282	...	15	...	430	(2)	2,179	5.19	z
Crookston	5,359	...	26	...	550	(1)	4,000	5.50	150.00
Detroit	2,060	8	9	...	430	(1)	4,000	Wood	84.00
Duluth	52,969	300	...	430	...	(1)	4,000	2.00	55.00
Fairmount	3,040	12	...	340	...	(2)(3)	1,000	3.40	(5)70.00
Faribault	7,868	53	...	480	...	(2)(3)	1,220	4.00	51.00
Fergus Falls	6,072	55	...	480	...	(2)	2,179	W. P.	36.36
Granite Falls	1,214	20	1	340	...	(2)	2,179	W. P.	z
Hastings	3,811	21	...	480	...	(1)	4,000	3.60	96.00
Jordan	1,270	18	...	550	...	(2)(4)	1,800	2.85	53.00
Lake City	2,744	54	3	340	...	(2)(3)	1,220	4.25	z
Le Roy	772	...	7	...	430	(2)(3)	1,200	3.25	54.00
Little Falls	5,774	28	1	480	...	(1)	3,667	W. P.	23-96 / 6-80
Mankato	10,599	60	...	480	...	(2)	2,250	3.20	74.00
Moorhead	3,730	30	6	480	430	(2)	2,179	6.50	120.00
Morris	1,934	...	6	...	550	(2)(4)	2,097	5.00	72.00
Northfield	3,210	...	35	...	430	(2)(3)	1,500	3.65	60.00
Owatonna	5,561	47	...	340	...	(1)(2)	2,600	3.35	72.00
Pipestone	2,536	11	...	340	...	(2)	2,179	5.00	.....
Red Wing	7,525	25	...	480	...	(3)	1,872	3.85	90.00
St. Cloud	8,663	48	...	480	...	(1)	4,300	W. P.	64.50
St. Paul	163,065	450	...	480	...	(1)	4,000	4.00	90.00
St. Peter	4,302	49	...	480	...	(2)(3)	1,100	4.00	50.00
Sauk Center	2,220	20	...	480	...	(2)(4)	2,100	Wood	80.00
Spring Valley	1,770	12	...	340	...	(2)	2,179	3.10	72.00
Tower	1,366	32	...	480	...	.....	3,020	4.20	120.00
Wadena	1,520	22	...	480	...	(2)	2,179	...	z
Wells	2,017	38	1	340	...	(3)	1,500	3.19	66.00
Winona	19,714	140	...	340	...	(2)	2,400	3.00	84.00
Zumbrota	1,119	...	8	...	430	(2)(3)	1,220	4.25	72.00
MISSISSIPPI									
Aberdeen	3,434	46	2	480	...	(2)	2,350	2.65	70.00
Columbus	6,484	43	3	480	...	(2)	2,400	2.00	72.00
Durant	1,766	...	25	...	550	(2)	2,179	2.65	60.00
Greenville	7,642	65	...	480	...	(2)	3,100	2.50	90.00
Greenwood	3,026	20	...	340	...	(1)	4,000	2.50	100.00
Holly Springs	2,815	...	30	...	430	(2)(3)	1,800	2.10	48.00
Kosciusko	2,078	...	30	...	430	(2)	2,179	3.00	60.00
McComb	4,477	...	30	...	430	(2)	2,179	(6)	66.00
Meridian	14,050	108	...	340	...	37-(1) / 71-(2)	....	2.50	96.00
Natchez	12,210	107	...	480	...	(1)	4,000	2.85	103.00
Port Gibson	2,113	29	18	480	...	(2)	2,500	3.10	z
Vicksburg	14,834	115	...	480	...	(2)	2,179	2.75	100.00
Winona	2,455	...	33	...	430	(2)	3,500	2.35	80.00
Yazoo	4,944	30	3	...	480	(2)	2,600	3.20	108.00
MISSOURI									
Aurora	6,191	20	...	340	...	(2)(3)	1,220	2.00	60.00
Bethany	2,093	34	...	340	...	(2)	2,251	3.00	z
Bowling Green	1,902	7	...	480	...	(2)(3)	1,220	2.00	96.00
Cape Girardeau	4,815	30	...	340	...	(1)	5,110	2.15	99.15
Carrolton	3,854	19	...	480	...	(3)	1,825	2.40	83.65
Carthage	9,416	...	27	...	...	(2)	2,179	2.00	z
Centralia	1,722	...	18	...	...	(2)(3)	1,220	1.65	75.00
Chillicothe	6,905	85	...	350	...	(1)	4,000	1.75	100.00
Clinton	5,061	45	...	480	...	(2)	2,600	1.90	75.00
Edina	1,605	23	...	340	...	(2)(3)	1,220	1.90	68.00
Gallatin	1,780	33	...	480	...	(2)	2,179	2.10	z
Hamilton	1,804	18	...	340	...	(2)(3)	1,220	2.50	78.00
Higginsville	2,791	43	...	340	...	(2)	2,179	1.70	z
Joplin	26,023	...	36	...	480	(1)	4,000	(7)	z
Kansas City	163,752	2	465	...	480	(1)	4,000	1.30	82.50

(1) All night. (2) Moonlight. (3) Midnight. (4) After midnight up to 1 or 2 A. M. The difference in time may be judged from the column showing number of hours lamps burn. (5) City is part owner. (6) Sawdust. (7) Water power and steam. z Municipal plant.

The data given in the above table were collected by the General Electric Company, Schenectady, N. Y.

(To be continued)

NEWS AND PRACTICE AMONG THE CITIES

New York to Own Ferry—Illinois Has New Paving Law—Estimates of London County Council—Electrolysis Destroying Water Pipes

Electrolysis Destroying Richmond's Water Pipes

The water mains of Richmond, Va., are still suffering from the effects of electrolysis due to the escape of current from the tracks of the trolley company. Despite the precautions that have been taken and the efforts made to prevent the trouble, it is still present. Since the railway company bonded its rails all over the city, the destruction has been checked, but enough exists to complete the destruction already begun. The common council recently appropriated about $1,000 for the purpose of hiring an expert to examine into the various plans proposed for the eradication of electrolysis.

Municipal Ferry for New York

Within a year from date, the city of New York may operate the ferry to Staten Island under municipal ownership. A law was passed at the last session of the legislature, authorizing the city to take by condemnation process all the property it needed for ferry purposes on Staten Island, and the Board of Estimate and Apportionment authorized such proceedings to be taken by the corporation counsel. The city has also the power to buy boats and to operate the ferry, and the project may be carried out as favored by Mayor Low. The matter has been put over by the Aldermen until December, when the motion of Alderman McCall for municipal ownership of the ferry will be acted upon. The estimated cost of the terminals and the new boats is $3,250,000. Inasmuch as the other boroughs of the city are being or about to be joined together by tunnels and bridges, it is only right that the residents of Staten Island, the Borough of Richmond, should have something done for them to unite them with the other boroughs. At present the transportation to that borough is very poor, the boats old and the service inadequate.

Municipal Light Plant Meeting with Success

After a period of three months, the results from the operation of the municipal electric light plant have been most pleasing to the citizens of Pitcairn borough, Pa. It is the only town in the section owning its electric plant, and so is of great interest to its neighboring municipalities. It is claimed that the plant is already saving money to the borough, the annual expense of running the plant as based upon the three months' experience being $1,800. To supply the same number of lights, the local private company would charge $3,000 a year. In addition to the street lights, every patron has the privilege of one 50 candle-power incandescent on his front porch free of charge. Residents are furnished light at 2 cents less per 1,000 watts than was allowed by the local company.

New Paving Law for Illinois

The new paving law recently passed by the Legislature of Illinois is of the greatest interest to cities in the State. The interesting provision of the law is contained in Section 4, as follows: "When any such city, town, or village shall, by ordinance, provide for the making of any local improvement, it shall, by the same ordinance, prescribe whether the same shall be made by special assessment, or by special taxation of contiguous property, or general taxation, or both. But in cities, towns or villages having a population of less than twenty-eight thousand and more than twenty thousand, ascertained as aforesaid, no ordinance for making any local improvement to be paid by special assessment or by special taxation of contiguous property, shall be adopted, unless the owners of one-half the property abutting along the line of the proposed improvement shall petition for the same: Provided, however, that on a petition signed by one hundred property owners in cities, towns and villages containing a population ascertained as aforesaid, of between twenty-eight thousand and fifty thousand, the question be submitted to a vote of the people at any general or special election, whether or not said improvements can be made, unless the same is petitioned for by at least one-half of the property owners abutting on the line of said improvement, and, if a majority of all the votes cast at such an election shall be in favor of said proposition, then a petition as heretofore provided, shall be necessary in such city, town or village before an ordinance can be passed."

Tax Levied on Rental Value of Premises

A bill respecting municipal taxation was introduced in the Ontario legislature at its last session. It provided that the personality tax, which is the tax on property other than real estate, shall be done away with, and in its place was to be authorized a tax based on the rental value of the premises occupied by those engaged in business. Experience has shown that the personality tax, like the income tax, is too easily evaded, and its collection is accompanied by great injustice, the wealthy, as a rule, escaping much of their share. The income tax now collected in some municipalities in Ontario is to be replaced by a house tax, based, like the business tax above mentioned, on the value of the premises.

Respecting the taxation of corporations that use the highways, they are to be assessed on the value of their rights to use the public property, as well as on the actual value of their real property. The taxes on the gross receipts are to be abolished.

Work on New Orleans' Sewer System Started

The great work of sanitation that is to give the city of New Orleans a proper drainage system and better the health of the city was started on June 25 last, when Mayor Capdevielle, with a silver spade, threw up some of the gravel on the line of the future sewer system. The work was started with some ceremony, the Mayor and other prominent citizens making speeches. In 1896 the agitation for the construction of the system was started, and in 1899 the Sewerage and Water Board was organized. Then came the work of surveying and planning what must be done, and the gathering together of an engineering force and the selection of an advisory board of engineers brought the time down to June, 1900. General outline plans had been prepared by General Superintendent G. G. Earl, and these were submitted to the advisory board. A satisfactory process of clarification of the Mississippi water was needed, and the board ordered that this be secured by experiments to run through a year. Many other lines of investigation were ordered carried out. In December, 1900, the board accepted the investigations made by Superintendent Earl and advised that detailed plans be made along the general lines submitted in the extended report of the General Superintendent. The funds available would not permit of the carrying out of the entire plans at once, so only that absolutely necessary to be undertaken was advised, and in June, 1901, the Sewer and Water Board adopted the plans and ordered them carried out.

Schenectady Becomes Second Class City

The State of New York has another city of the second class in Schenectady, the charter for which was signed by the Governor this spring. Schenectady has a population of over 50,000 at the present time, although at the last census it contained only 31,682. It cannot be raised officially to second class until the next census, but, in the meantime, it will have practically the same form of government as Rochester, Syracuse, Utica, Albany, and Troy, the cities of the second class. The new charter is almost an exact reproduction of the uniform charters under which they are governed. The police and fire departments are to be under the jurisdiction of a commissioner of public safety, and the water system, electric lights, sewers, streets, bridges, etc., under the control of the commissioner of public works. The mayor, who now serves without pay, will hereafter get a salary of $2,000. One new elective office is created, that of comptroller, at $1,750 annually. Much of the power now

vested in the common council will be transferred to the board of estimate and apportionment.

When the charter was being prepared the aldermen made a hard fight to retain some sort of a grasp on the government. They succeeded in keeping the power of appointment, which in second-class cities is vested in the mayor. They will also get a salary of $250 a year each. At present they serve without pay. Their retention of the appointive power gives them control of the patronage, but they will lose all grasp on the actual expenditure of the city's funds. Under the present charter the affairs of several of the most important of the municipal departments are administered by committees of the common council.

Schenectady's growth has been phenomenal during the last fifteen years. In 1890 there were about 20,000 people here. More than 30,000 have been added to the population since. Before the General Electric Company made Schenectady its headquarters the city was asleep, but all that has been changed. It is one of the oldest municipalities in the State, having received its charter from the Legislature in 1798.

Will Limit Number of Saloons

An ordinance that has met with public favor in Sacramento, Cal., was designed to limit the number of saloons in the city. By a gradual process it will reduce the number of saloons to 100, but will at once do away with the side entrances that have been a curse to the city, and caused the ruin of many of the city's young. The present ordinance will eliminate the saloons when the persons now holding licenses cease to conduct them, transfer them, or die. The Board of Trustees shall grant no licenses to other persons than those now engaged in the saloon business. After a period of thirty days from the adoption of the ordinance, no one running a saloon in the resident sections shall be permitted under any circumstances to change the location of his saloon. In the business sections a saloon may be moved to another business section if the consent of the property owners be secured.

Estimates of London County Council

The estimated expenditures for 1903-4 by the London County Council that directly affect the tax rate of the county will amount to $23,516,350, and the estimated receipts, $9,295,905, giving a net increase in expenditure of $1,045,355. Of this increase, $85,000 is due to a decrease in the estimated surplus profit from tramways. The most important items in the estimates relate to the Council's debt, showing the amount to be raised for interest. The total amount foots up $12,829,300, of which $9,099,130 is for interest. Only a portion of the increase will come from taxes, the rest being met from interest received from loans and out of receipts of remunerative undertakings, especially tramways and working-class dwellings. During the year 1902-3 the estimated expenditures amounted to $21,800,965, and the actual payments, $21,551,085. The estimated receipts were $8,560,025, but actually amounted to $42,460 less than the estimates.

The accounts given in the report of the finance committee of the Council are grouped in two main divisions, viz.: Accounts that directly affect the tax rate of the county, and accounts of expenditures met out of rents and other receipts. The accounts that directly affect the county tax rate are: General county account, special county account, (account of receipts and of expenses for which the county outside the city only may be rated), exchequer contribution account (proceeds of taxation licences, duty on estates, excise taxes, and used for technical education and certain statutory grants), debt account (for paying dividends and redeeming consolidated stock). The amount to be raised by rate for the general county account aggregates $11,944,685, with a rate of 56.5 cents on the $100, and $1,948,400 for the special county account, with a tax rate of 10.5 cents on the $100.

The accounts of expenditures that are met out of rents and other receipts consist of: Tramways account (income and expenditures connected with the tramways), working class dwellings and lodging house account, dwelling house improvement fund (other than working class dwellings and lodging houses), small holdings account (in connection with lands hired under an act of 1892).

Long Term Franchises Cannot Be Granted in Kentucky

An opinion rendered to Hon. Charles F. Grainger, Mayor of Louisville, Ky., by Henry L. Stone, the city attorney, is interesting from the fact that it publishes the provision of the State constitution which states that, "No county, city, town, taxing district or other municipality shall be authorized or permitted to grant any franchise or privilege, or make any contract in reference thereto, for a term exceeding twenty years. Before granting such franchise or privilege for a term of years such municipality shall first, after due advertisement, receive bids therefor publicly and award the same to the highest and best bidder; but it shall have the right to reject any or all bids. This section shall not apply to a trunk railway."

The opinion was rendered in reference to a franchise that the council had granted to a street railway company, and which was awaiting the signature of the Mayor. City Attorney Stone found grave faults in the provisions of the franchise. In the first place it was unconstitutional and void inasmuch as it violated the section of the constitution given above, because no time limit is set for the duration of the franchise. No forfeiture is provided for in case the company does not complete the road within a fixed period. The Council did not attempt to sell the franchise to the highest bidder, but gave it away gratis. The possible claim that the road in question was to be a trunk line, was shown to be erroneous by Mr. Stone, as he said, "No railway whose tracks are laid in or along the streets of a city for the purpose of engaging in the business, on all or a material part of its line, of carrying passengers from street to street, or between points within the limits of such city, stopping to take on and let off passengers, and using street cars with like or similar appliances, motive power and motormen, to those of street car companies, and performing the same public service usually rendered by ordinary street car companies, can, by any fair or reasonable construction, come within the meaning of the term 'trunk railways' as used in the constitution."

How to Get Rid of the Mosquito and Malaria

In the report of the secretary of the New Jersey State Board of Health, Mr. Henry Mitchell, is a section devoted to malarial fevers and their cause. Malaria is due to the presence in the red blood cells of a parasite that is transmitted from person to person by the mosquito of the genus Anopheles, and the experiments that have been carried on in different sections of the State for the extermination of this mosquito have had the effect of lowering the death rate from malaria for the last three years. Permanent measures for the prevention of the development of the mosquito have been found in the drying up of all breeding pools. They were filled up with earth or deepened and shallow banks removed, so that the mosquito larvæ could be reached by fish. Persons affected with malaria should be placed in rooms screened from the entrance of mosquitoes that the disease may not be carried to others. The burning of a little pyretheum in a room will kill the mosquitoes that may have gotten in. The report recommends that local boards of health inspect premises for the presence of pools of standing water and require that all such breeding places, including the still-water pools along the banks of streams, the swampy margins in ponds, the stagnant water in ditches and gutters, in yards, etc., be drained, stocked with larvæ-destroying fish or covered with a film of oil. All acute cases of malaria should be isolated to prevent the spread of the infection.

An illustration of how draining will aid in the elimination of mosquitoes was given recently on the meadows about Elizabeth. The council of that city had appropriated $1,000 for the draining. The meadows that were once mud and pools of stagnant water were drained by means of ditches, dug fifty feet apart. Men cut through the meadow growth with saws, making the ditches two feet deep and connecting them with the Elizabeth river. When the tide rises these ditches are filled with water in which are numerous fish that eat the larvæ of the mosquitoes. About 5,000 feet of ditch were dug at a cost of about a cent a foot. Previous to the draining the meadows were very soft, but now they are dry. Where the pools had been could be seen the dead larvæ of the mosquito, showing that the work was successful.

STANDARDS FOR TOWN FIRE PROTECTION

Report of Committee to National Fire Protection Association—How to Grade Towns According to Means for Fire Fighting—Classification of Fire Departments

THE following suggestions in relation to the formation of a "standard for grading town fire protection" were made by a committee of the National Fire Protection Association, and we have extracted the salient points in the report of the committee. The question before the committee was, "Should not a standard be adopted for permanent equipment and water supply service * * * which shall be at once intelligible and comprehensive?" None of the present methods for grading towns in respect to their fire protection are sufficient, and it is evident that the most carefully prepared standard of requirements, even when entering into minute details, will not properly serve for universal or "automatic" application, and may, at best, only form a basis schedule upon which to erect a practicable standard, which, to prove of value, must be carefully and intelligently applied in each locality, after proper investigation of the conditions which tend to the promotion of disaster by fire.

"While it is true that no two cities or towns of approximately equal population can be treated as identical in respect of relative fire hazard, owing to the differences in the class of construction and the congestion of values under varying conditions, it is also true that it is not always practicable to proportion the water and fire service of every city or town in such measure as to be fitted at all times to successfully combat the emergencies of a great conflagration; hence, in the formulation of an 'intelligible and comprehensive' standard of water supply and fire service, some theory must be adopted as a base; but in no case should compliance with theoretical conditions be considered as satisfactory until proper practical tests of the system have been made, whereby may be accurately demonstrated the value of the water supply in relation to its reliability, availability, volume and pressure at the point of tests, under conditions similar to those which might prevail in the case of an actual fire.

"The data thus secured would properly indicate the possibilities of fire protection in the districts under test, without awaiting disaster for practical demonstration, and at the same time present the conditions upon which to properly found a justifiable base rate.

NO DEPENDENCE TO BE PLACED ON RECORD OF STATIC PRESSURE

"In order to reach satisfactory conclusions in relation to the efficiency of a water supply under the tests above suggested, it is well to bear in mind that no dependence can be placed upon the record of static (still) pressure as an assurance of volume or of utility, for in many instances such indications of head or pressure are proven illusive and misleading when one or more streams of standard volume are allowed to flow from the system; hence, these tests should in all cases be made with water flowing simultaneously from such number of outlets as may be deemed necessary for the ample protection of the town as a whole, or for any one or more of its separated sections, singly or collectively; each such stream to show a standard of delivery of not less than 250 gallons of water per minute through an inch-and-an-eighth smooth nozzle at the end of not less than one hundred feet of standard rubber-lined two-and-a-half-inch fire hose, with a flowing pressure, with all outlets open, of not less than seventy-five to seventy-six pounds to the square inch at the hose inlet.

"A stream of this character, at the pressures indicated, will be propelled to a vertical height of eighty feet and about seventy feet horizontally, thus serving with efficiency for fire purposes in the average town or city up to 30,000 population, where building in excess of sixty feet in height are not of usual frequency.

"In this connection it may be well to state that a single standard fire-stream consumes water at the rate of about 400,000 gallons per twenty-four hours, and though such use may not be of long duration at any one time, it is essential that the maximum volume be always available, in addition to the maintenance of the necessary quantity for the average domestic and manufacturing daily supply during the time the fire-streams may be in use, as there are occasions, even in the smaller towns and cities, when the volume of water needed for fire extinguishment may, for hours at a time, exceed all other demands upon the supply in the proportion of eighty to one, and during such times, it is not practicable to cut off the domestic supply to supplement that needed for the emergency of fire.

NO FIRE STREAMS NECESSARY FOR PROPER PROTECTION

"While there is no fixed and absolutely reliable rule upon which to calculate the number of fire-streams necessary for the proper protection of a town in proportion to its population, there are several theoretical propositions in relation to such apportionment, having the sanction of eminent hydraulic engineers which may be assumed as sufficiently reliable to form a base for the formulation of the standards under consideration. In illustration of these theoretical bases, the following is abridged from a very interesting and instructive article by Mr. J. T. Fanning, C. E., the tabulation showing at once the approximate number of fire-streams needed for concentrated use at one time, and the volume of water necessary for both fire and domestic service per diem in towns of the stated population, in millions of gallons:—

POPULATION.	STREAMS.	FIRE FLOW.	DOM. FLOW.	TOTAL FLOW.
4,000	7	3.90	.20	4.10
5,000	8	4.10	.25	4.35
6,000	8	4.30	.30	4.60
8,000	9	4.65	.45	5.10
10,000	9	4.90	.60	5.50
15,000	10	5.50	1.00	6.50
20,000	11	5.90	1.40	7.30
25,000	12	6.25	1.90	8.15
30,000	12	6.50	2.40	8.90

"The quantities noted in the table are based upon a direct pressure (gravity or pump) water supply, and show an average of from fifty gallons per head at 4,000 population to eighty gallons per head at 30,000 population for domestic service alone. The per capita supply for population below 4,000 may safely be held at fifty gallons per day for domestic service, and this constantly available supply must be augmented at the rate of 400,000 gallons per twenty-four hours for each of the total number of standard fire-streams, assumed to be necessary for simultaneous use in case of fire in any section or district of the town. An approximate estimate of the number of fire-streams necessary for the protection of towns of less population than 4,000 may readily be calculated on the lines set forth in the above table, but final conclusions should be based upon the needs of each case separately, considered after inspection."

The prime object to be attained by the water supply of a town is the assurance of its efficiency for fire service, the essentials being a permanent source of supply, ample volume and constant pressure. It makes little difference what method is used in securing the proper pressure, but there is a decided choice of systems in relation to ownership, safety from accident in operation, and constant service when a town or city is to be graded in respect to fire protection. "Primarily, the operation and control of a water supply under municipal ownership is to be preferred as compared with one under private ownership," because the former will better serve public interests without reference to profits.

CLASSIFICATION OF WATER SUPPLY SYSTEMS

"Comparing the various systems of water supply in common use, it appears exigible to classify them in the following order of excellence:

"A. Gravity flow from a sufficiently elevated reservoir or impounding basin, fed from its water shed or from flowing streams; or from a reservoir formed by a natural lake. Storage capacity to be equal to all demands for service, and source of supply to be re-

liably constant in flow to replace depletion in use. Supply mains to service distribution system to be in duplicate.

"B. Gravity flow from a sufficiently elevated reservoir to which the supply is delivered by duplicate sets of hydraulic or steam power pumping engines, drafting from a source of constant supply. The reservoir to be of sufficient capacity to hold in store from six to ten days' reserve supply equal to the average service for all purposes. The combined capacity of the pumping engines should be equal to the delivery of the total average per diem supply of the town within ten hours, and one-half of the pumping capacity should accomplish the same result within twenty hours of continuous operation. Supply mains to service distribution system to be in duplicate.

"C. Gravity flow from combined and connected high and low-service reservoirs, the water supply from same being secured by any of the methods indicated under 'A' or 'B'; supply mains to the distribution service to be in duplicate. High and low-pressure service to be properly connected so as to permit high service pressure in low-pressure distribution in case of fire or other emergency.

"D. Direct-pressure service by means of duplicate sets of hydraulic or steam power pumping engines, supplemented by an auxiliary reservoir or stand-pipe, having independent supply mains to the distribution system and also duplicate supply mains from the pumping station to the distribution, provided with proper checks against the reservoir or stand-pipe in order to permit high-pumping service in the distribution.

"E. Direct-pressure service by means of duplicate sets of hydraulic or steam power pumping engines, without the use of an auxiliary reservoir or stand-pipe. Supply mains from the pumping station to the service distribution to be in duplicate and to be provided with proper relief and other safety device to prevent accident.

"F. Gravity flow from a sufficiently elevated reservoir to which the supply is delivered by duplicate sets of pumping engines actuated by gas or gasoline engines operating on the explosion principle. In all other respects to conform with the conditions under class 'B.'

"G. Public fire cisterns having capacity from 40,000 to 60,000 gallons each, filled from flowing water, natural springs or some other reliable source, properly located and in sufficient number to afford the protection demanded.

"H. Water supply from permanent ponds or flowing streams accessible to engine suctions and contiguous to congested districts of buildings or values wherever located in the town.

"Given a water supply fully covering the essentials of adequate volume, pressure and availability at points where needed on demand in relation to the full supply of the total number of standard fire-streams deemed necessary to meet the requirements of each district or locality, and which, in other respects, is in full conformity with any one of the several conditions above delineated, the methods by which the supply is secured and may best be utilized for the purpose under consideration, appear to segregate themselves (from both the hydraulic and fire-engineering view-points) into the following order of preference:

"Methods 'A' to 'C' inclusive, as first class; 'D' as second class; 'E' as third class; 'F' as fourth class; 'G' as fifth class; and 'H' as sixth class."

Gauging of the Base Rating

Respecting the propositions above presented, the only safe foundation upon which must rest defence for variation in "base rating" in different places is the efficiency and reliability of water supply shown after tests under conditions similar to those developed in case of an actual fire. The committee suggests that an issue of "base rating" be gauged on a gradually rising scale in relation to the water supply, and attempts to standardize such public utilities in order to term the conditions upon which to add charges for deficiencies. In class "A," when the works are owned by the city, the pipe scheme coming under methods classified from "A" to "F" inclusive should have duplicate supply mains from the source to the place of distribution, each main being sufficiently large to alone supply the average requirements. Gate valves should divide the distribution service and be installed on the "gridiron" system. No main for use in fire service should be less than six inches in diameter in the residential, or eight inches in diameter in the business sections, submains being not less than ten or twelve inches. "Dead ends" should be avoided or should empty into a fire cistern of at least 40,000 gallons capacity. Underground water mains should be cast-iron, tar-coated, and laid below the frost line; provided with gate, check, waste, and relief valves. The fire hydrants should not be more than three hundred feet apart in the business and not more than four hundred and fifty or five hundred feet apart in the minor retail districts. Suction connections for engines should not be less than four inches in diameter. The hydrants should be self-draining, have uniform threads on outlets and frost-proof jackets, where necessary.

"It is well to emphasize here the fact that it is more economical practice to provide numerous hydrants than to purchase fire hose, as the price of one hundred feet of standard fire hose is about the same as that incident to the complete installation of a good two-way hydrant, including one hundred feet of standard six-inch cast-iron main, trenching, laying, and setting up. (Freeman.)"

Division of Fire Department Organization

The organization of the fire department and its equipment will depend upon the system of water supply and the necessities of the city developed through careful investigation. However, the various systems of organization may be placed in well-marked divisions with relation to their efficiency.

First Class.—Chief, subordinate officers and full complement of men to each company full paid and permanently housed in company quarters; apparatus to be fully manned and be drawn by horses owned by the department, trained for the service and used for no other than fire department purposes.

"*Second Class.*—Chief, subordinate officers and larger half of the men of each company full paid and permanently housed in company quarters; balance of the complement being 'call-men' paid for service performed; other conditions as to organization being identical with those nominated for the first class.

"*Third Class.*—Engineers, stokers, drivers, and tillermen to be full paid and permanently housed in company quarters, the balance of the complement being volunteers. Other conditions as to organizations being identical with second class.

"*Fourth Class.*—Engineers and drivers only full paid and permanently housed at company quarters; balance of the complement being volunteers. Horses belonging to the department, but used for other purposes during the day time when not on duty in fire service.

"*Fifth Class.*—Fully organized and officered volunteer service, under municipal control and with apparatus drawn by hired horses

"*Sixth Class.*—Same as fifth class, but with apparatus drawn by manual power.

"*Seventh Class.*—Volunteer service without regular organization, not under municipal control and with manually drawn apparatus."

With regard to the equipment, the proper utilization of a water supply depends upon the presence and use of fire hose; secondly, there should be a sufficient quantity of it kept in condition for instant service, so that the full number of streams deemed essential for any district can be readily supplied.

"Estimating on the basis of general practice as well as upon the theory already presented, each fire-stream of the number required for full protection should have a complement of about 400 feet of standard 2½-inch rubber-lined hose always available for service, and in addition to this quantity the department should maintain a reserve supply equal to not less than 50 per cent. of that in service, with proper means and apparatus for the safe and rapid transportation of both supplies to the scene of operation as an essential factor in any equipment. The class of device most highly recommended for use in carrying hose appears to be the wagon, and where this class of vehicle also carries a chemical tank and its appurtenances, its value for fire service is greatly enhanced and its presence in an equipment is to be commended."

One or more hook and ladder trucks and one or more steam fire-engines should be an essential part of any equipment, their number depending upon the area of the territory in the fire department.

New Fire-Boat for Milwaukee

THE new fire-boat that the city of Milwaukee, Wis., will soon add to her fire fighting force has at last been launched, and is now being fitted out with machinery and put in shape for service. The boat was designed by W. L. Wood, a naval architect of Chicago, where the boat was built, after ideas submitted to him by Chief James Foley, Milwaukee's last fire chief. It is claimed that this fire-boat will be the most powerful in the world.

The boat will be conspicuous for its strength, power of resistance in case of collision or working in ice, swiftness, and handiness of steering. It is built of open hearth steel and has the following dimensions: Length over all, 118 feet; length between perpendiculars, 107 feet; extreme breadth, 26 feet; extreme depth, 13 feet 6 inches; draught aft, 10 feet 6 inches; draught forward, 10 feet. The hull is subdivided, having four transverse water tight bulkheads, water tight over trimming tanks forward and over after peak, and in addition to these the coal bunkers are carried along the sides the whole length of the boiler space.

On deck will be a continuous steel house 72 feet 6 inches long, 14 feet wide, and 6 feet 9 inches high. In the forward end will be the pilot house, finished in mahogany, back of which will be the hose-room. Boilers and engine will occupy the balance of the space in the deckhouse.

In the hose room will be located two large reels to work in unison and coil the hose. A thirteen-inch searchlight will be on top of the pilot house and will be controlled from within the house. A current of twenty amperes will furnish the light. There will be two rotary brass turrets on the top of the deck house, the former one having an eight-inch and the after one a six-inch supply pipe. Bathrooms and lavatories, steam-heated and furnished with hot and cold water will be located in the forecastle, where are also bunkers and wardrobes. There will be a fully equipped work shop on board.

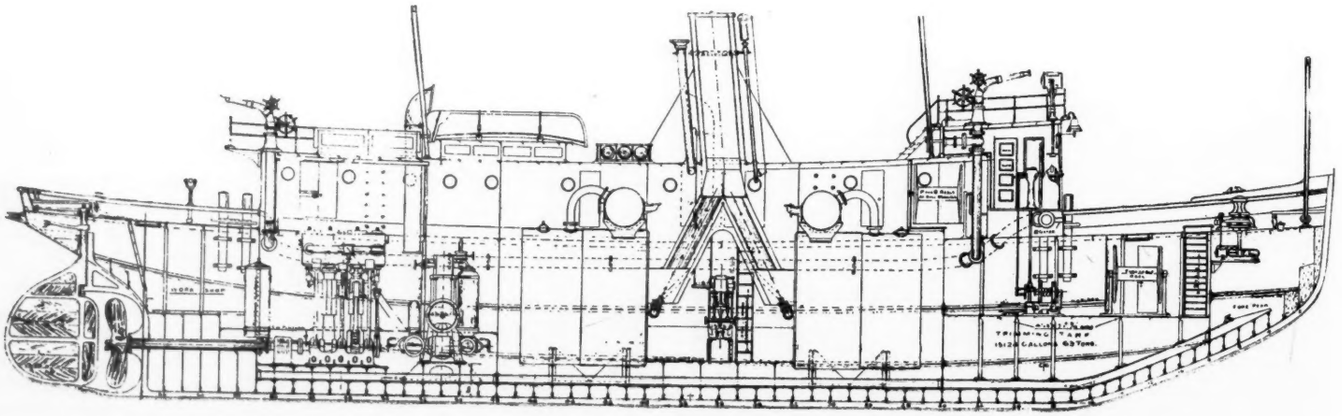
The deck is of steel plating, "blind punched" to prevent slipping, and there will be a telephone apparatus in the pilot house and engine room that can be readily connected with the shore lines. The main engine is of the vertical, inverted, two-crank, high-pressure kind, driving a single screw. The two cylinders are twenty-inch diameter and twenty-inch stroke, to operate with boiler pressure of 140 pounds. The pistons are semi-steel, and the rods forged steel, four and one-half-inch diameter. Stephenson double bar link motion is used, with cast iron eccentrics, wrought iron rods, steel valve stems, and hard brass link blocks. Hammered iron is used for the crank shaft, which is eight-inch diameter, with couplings forged on, and also for the pins, the crank slabs being of cast steel. The propeller is of cast-steel, eight-foot diameter, ten-foot pitch, four-bladed, extra heavy for service in ice, and designed with a view to giving the maximum efficiency when backing. The auxiliaries include two Worthington Admiralty type duplex pumps, placed one on each side of the boat in pockets in stoke-hold. A Worthington duplex, sanitary pump is also included, with both sea and fresh water tank connections. Forward of the engine and in the same compartment are three double-acting vertical, simple, duplex, crank and flywheel pumps. The steam cylinders are seventeen-inch diameter and eleven-inch stroke and are of cast iron, with piston valves. The pump ends are composition, with water cylinders ten-inch diameter and eleven-inch stroke. Each pump will have a minimum capacity of 3,000 gallons per minute, with a pump pressure of 170 pounds per square inch, the steam on boilers reckoned on being not less than 125 pounds. The pumps are designed with large free passages and valves, and large suction and air-chambers. The running parts are of steel and the pump rods Tobin bronze. The standpipes are to be fitted with adjustable nozzles, throwing a five and one-half inch stream.

The two boilers will be of the Scotch Morison type, and will withstand a working pressure of 140 pounds. The stoke hole will be fitted with hydro-pneumatic ash-ejectors and an arrangement for hoisting up the ashes through the ventilators by means of tackle. The boat is to be lighted by electricity, to be furnished by a complete lighting plant aboard, consisting of a seven K. W., 110-volt, direct-current generator, direct connected to an engine giving 550 revolutions a minute at a steam pressure of eighty pounds. The pumps were made by the American Fire Engine Company, of Seneca Falls, N. Y., the boilers by John Moir & Sons, of Chicago, and the propelling engine by the Chicago Shipbuilding Company. The Shipowners' Drydock Company built the boat, and it cost Milwaukee $100,000.

Police Pension Funds

THE sum of $502,303.32 for the coming year was asked by the police board of Jersey City, N. J., which will provide for fifty additional first-class men. There is a deficiency of $10,000 in the pension fund and $15,000 of the above amount is to be used to overcome this. The law requires that an appropriation of 4 per cent. of the total salary account shall be made, but this has seldom been lived up to, and the reserve fund has been required to supply the deficiency. The finance board ordered that $2,500 be transferred from the contingent fund to the pension fund, and the police board transferred $718.91 from the salary account to go for pensions. The men are required to contribute 1 per cent. of their salaries to this fund.

Indianapolis, Ind., looks after its policemen in much the same manner as Jersey City. Members of the force who are eligible to a pension must have served at least eight years under the new law, and this prevents any frauds or of incompetent persons taking advantage of the pension to gain a means of livelihood at the expense of the public. After twenty-five years of active service any member of the force may retire on half-pay for the remainder of his life, and should any member become ill or otherwise incapacitated after eight years of service he is pensioned off on half-pay during such time as he may be unable to perform duty. A certain percentage of all taxes is laid aside annually for the pension fund, and each member of the force is taxed 1 per cent. per month of his pay for the same fund. All money received for rewards for special duty, etc., is also devoted to the pension fund, so that the fund is ample to meet all demands. Widows of police officers dying while in the service are allowed $20 per month as long as they remain widows, and each child receives $6 per month until it is 16 years of age, when this pension ceases. The police officers receive $2.25 per day wages.



LONGITUDINAL SECTION OF MILWAUKEE'S NEW FIRE-BOAT

WHAT POLICE AND FIREMEN ARE DOING

Conning Tower for St. Louis—Meeting of Municipal Electricians—Improvements in Ohio Cities—Work of Police and Fire Forces

State Firemen's Association Proposed for Texas

THE chiefs of the fire departments of several cities in Texas have been seeking to form an association corresponding to the State association of volunteer departments. The paid departments of Dallas, Fort Worth, Waco, San Antonio, Galveston and Houston are expected to join, and, if agreeable to the volunteer association, the association of the paid departments will affiliate with it. The plans embrace the establishment of a home for old and incapacitated members and the organization of a mutual insurance department.

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New Device to Handle Hose

A DEVICE to facilitate the handling of hose at fires has been patented recently that is extremely simple and effective. It consists of a bar of heavy metal, at the ends of which are attached two downward-curving hooks set at right angles to the bar and pointing in opposite directions, with a space between them sufficient to easily pass the largest hose. To the bar is attached a handle similar to that of a spade, and to which is fastened a hook, so that the device may be suspended on the round of a ladder. In operation, the device is slipped over the hose, so that the latter comes between the two hooks, when a turn of the wrist forces the hooks under the hose. This makes a convenient handle to use on the hose lines and which can be shifted at will, but giving the firemen a firm hold on a hose that is not otherwise afforded except by the handles on the nozzle.

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Salaries of Hawaiian Firemen and Police

THE salaries for the fire department of Honolulu, H. I., have been fixed as under the following schedule: Chief engineer, $1,200; assistant chief, $750; relief driver, $480; hydrant man, $480; secretary, $150; seven foremen, $3.570; thirteen drivers, $6,240; four stokers, $1,560; twenty-eight hosemen, $10,920; pipemen, $780; five watchboys, $900; five truckmen, $1,800; five engineers, $3,750.

The pay of police of Hawaii was suggested by the committee in charge for the six months:

South Hilo—2 captains, $1,200; 2 lieutenants, $720; 8 police, $2,400; 2 police olaa, $600; 1 Portuguese, Chinese, Japanese and Porto Rican officer, $300 each; 2 station clerks, $720; 2 mounted police, $1,080; total, $7,920.

North Hilo—Captain, $300; 3 police, $720. Hamakua—Captain, $360; 4 police, $1,080. North Kohala—Captain, $360; 4 police, $960; 2 police, $360. South Kohala—3 police, $720. North Kona—Captain, $360; 5 police, $1,200. South Kona—Captain, $360; 4 police, $960. Kau—Captain, $360; 4 police, $960. Puna—Captain, $360; 4 police, $960.

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Improvement Suggested for Youngstown

THE heads of the police and fire departments of Youngstown, O., recently suggested some improvements that would add greatly to the efficiency of their respective commands. Chief W. H. Loller, of the fire department, asked that three cadets be assigned to the force and that the office of lieutenant for each company be created. The present force consists of a chief, an assistant chief, six captains, twenty-nine firemen and three cadets. The last are used to relieve firemen that are on vacations. At present during meal times, there are but two men at each station, a driver and a fireman. These could not handle the apparatus if an alarm should be sounded. In the absence of the captain no one is in charge of any fire, and the creation of the office of lieutenant would not increase the force, but would ensure an officer at all alarms of fire. These officers could be promoted from the ranks.

Chief W. W. McDowell, of the police department, recommended that two night sergeants be appointed to look after the patrolmen on their beats, and see that they did their duty. A small increase in salary would be the only expense, as the men could be promoted from among the patrolmen. The sergeants would report by 'phone every hour, and the chief figures that they would increase the efficiency of the department to the extent of eight men.

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Fire Conning Tower for St. Louis

AN innovation in the shape of a conning tower for fires has been introduced into the fire department of Kansas City, Mo., Chief Trickett having had the tower fitted up on the top of the Studebaker building. The tower is connected by telephone with headquarters, and with the pumping station of the waterworks. A man will always be in the tower on watch for fires. From the tower all parts of the west bottoms can be seen, as well as all the packing houses to the south, and, in view of the tangled condition of the fire alarm wires, due to the flood, an alarm could be sent to headquarters from the tower sooner than by the regular way. The board of fire underwriters have approved the idea.

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Good Work in Somerville

THE problem of keeping down the fire losses in Somerville, Mass., is one that taxes the best energies of Chief J. R. Hopkins, but the good discipline of the men and the quickness of response to an alarm have thus far kept the losses within bounds. This is especially good showing, inasmuch as the city is composed almost entirely of frame dwellings. During the past year in but three instances was it necessary to sound a second alarm. The total number of alarms for the year was 272, twenty of which were false. In no instance was a building entirely destroyed. There are eighty call and thirty-six permanent men in the department. The apparatus consists of three steam fire engines with hose tenders, a chemical engine, two combination chemical engines and hose wagons carrying ladders, three hose wagons and two hook and ladder trucks. Chief Hopkins considers that engines throwing powerful streams are not often needed, but should be ready if called upon. The value of buildings placed in risk by fire amounted to $280,075, and the damage aggregated $28,597.50. The value of the contents was $64,950, and the damage to the same, $25,472.50.

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Civil Service in Sandusky

ON July 1 the police and fire departments of Sandusky, O., were placed under the new civil service rules. Hereafter there will be little chance for favors of appointment to the forces at the hands of the mayor. The mayor is to make requisition and the board of public safety will certify to a list of names eligible for appointment, and an appointment must be made from the list within five days. Records of each policeman and fireman will be kept. In the fire department the officers are to be the chief marshal and captain. Upon the proper advertisement being published, applicants for positions must fill out the proper blanks and be physically examined. In the police department, applicants must be between the ages of twenty-one and thirty-five, not less than five feet, nine inches in height, or over six feet, four inches, and must weigh not less than 150 pounds, and not more than 235, the weights being proportioned to height in a schedule. In the fire department, the age limit is the same, but the height may be only five feet, four inches, and the weight as low as 125 pounds. Applicants must have a grade of 75 per cent. in a mental examination, and must be temperate and of good moral character. No habitual user of, or vendor in intoxicants shall be eligible. Proof of bad character or of having committed a disgraceful act will be sufficient to exclue an applicant from examination.

Work of Fall River Police

THE work of the police department of Fall River, Mass., for 1902, appears in the annual report, and consists mainly of a mass of statistics showing in an interesting manner an analysis of the arrests and causes of arrests. It appears that he number of persons arrested during the year was 4,901, an increase of 12.58 per cent. over the number of arrests for the preceding year. There was an increase of 16.02 per cent. of arrests over the average for the preceding seven years, and was 4.51 per cent. of the population. There was a slightly larger increase in arrests of females than of males. Of the total number of arrests, 456 were for offences against property. While the amount of property lost during 1902 was larger than for the average of the preceding seven years, the amount recovered was over twice the average for the seven years. Arrests of non-residents formed 18.9 per cent. of the total, being larger than for the seven preceding years. Forty-seven and seven-tenths per cent. of the population is foreign and the number of foreigners arrested formed 60.88 per cent. of the whole, being larger than for two years past. The proportion of prisoners of foreign birth was 27.42 per cent. greater than the proportion of the population of foreign birth. While but 35.1 per cent. of the population is between the ages of twenty and thirty-nine, the number of arrests for these ages was 53.17 per cent. of the total. During the year charges were brought against but three officers out of the ninety, and in but two cases were the charges sustained, a suspension in one and a reprimand in the other case being the punishment.

Police Chiefs of Texas Meet

THE ninth annual meeting of the Association of Chiefs of Police and Town Marshals of Texas was held at Waco, Tex., June 23 to 25. Chief W. M. Rea, of Fort Worth, president of the association, in his address, made a plea for support of the Bureau of Criminal Identification, which must look to private subscription from the municipalities using it for its support. For cities under 50,000 population the privileges of the bureau are secured for an annual fee of $15. Cities of 25,000 and under must pay $10. On the second day of the session a paper was read by Chief H. E. Criswell, of Yoakum, on the relation of youth to the pawnbrokers, and stated that minors should not be permitted to buy from or sell to pawnbrokers. City Attorney L. T. Williams, of Waco, addressed the association on his experience with criminals. He supplemented Chief Criswell in regard to his remarks on pawnbrokers and minors. Chief Casey, of Texarkana, read a paper on officers in their dealings with criminals. The election of officers resulted in the selection of Chief Rea, of Fort Worth, for president; J. G. Blackburn, of Houston, M. J. Niland, of Corpus Christi, and R. L. Winfrey, of Dallas, first, second, and third vice-presidents, respectively; M. T. Forrest, of Houston, secretary-treasurer; A. T. Criswell, of Yoakum, sergeant-at-arms.

Municipal Electricians to Hold Convention

THE eighth annual convention of the International Association of Municipal Electricians will be held at Atlantic City, September 2 to 4. The Hotel Rudolf will be the headquarters, where special rates have been secured. These will run from $2.50 a day to $4.50, according to the accommodations.

Three papers of interest are promised, viz.: "The Best Methods for Lighting Small Cities," "Classifying of Records of Electrical Departments and Standard Specifications for Supplies and Contracts," and "Importance of Fire and Police Telegraph Systems." There will also be a topical discussion of line connection, and members will have an opportunity to give their ideas on this important question. A large number of practical questions will be discussed at the sessions. The last day of the convention will be devoted to demonstrations of the different materials manufacturers have to sell, and the members will have presented to them what has been done during the past year in improvements.

Among the special features will be an exhibit of the Cooper-Hewett mercury vapor lamp and converter and a demonstration of the Deforest system of wireless telegraphy. Further information can be obtained from the secretary, Mr. Frank P. Foster, superintendent of fire telegraph, at Corning, N. Y.

Police and Fire Personals

—Chief Edward O. Goodwin has been unanimously re-elected as head of the fire-department of East Hartford, Conn.

—At the regular July elections held by the City Council of Atlanta, Ga., Chief W. R. Joyner was re-elected as head of the fire department.

—Chief George Holland, of the police force of Rutherford, N. J., while hurriedly crossing the street last month, fell and broke his knee cap.

—The members of the Association of Chiefs of Police of Texas have re-elected as their president for the ensuing year Chief W. M. Rea, of Fort Worth.

—The Hon. Simon Seibert has been appointed by Mayor Knight, Fire Commissioner of Buffalo, N. Y., to succeed John Malone, whose term of office had expired.

—Chief of Police D. Edwin Smith of Newport, O., has been discharged by the Board of Police and Fire Commissioners and H. H. Deputy appointed in his place. Mr. Deputy is a young attorney and a strict disciplinarian.

—Mr. Henry J. Cunningham has been appointed by Mayor McNamee of Cambridge, Mass., to be chief of the police department of that city. He is a real estate dealer and will succeed Chief Lothrop J. Cloyes who has retired.

—Chief James Dunlevy of the fire department of Evansville, Ind., was recently the recipient of a beautiful gold badge set with fifty diamonds. The members of the department and the Chief's friends were the donors and Mayor Covert made the presentation.

—Chief Conway of the Jersey City, N. J., fire department is firm against permitting firemen to carry umbrellas on rainy days while they are in uniform. He says that any fireman who is afraid of rain is not fit to be a member of the department. If a man does not want to wet his uniform, let him put on his rubber clothing.

—Mr. William D. Dougherty was recently named by Mayor Knight, of Buffalo, N. Y., as a new Police Commissioner to succeed Mr. John H. Cooper, resigned. The new commissioner is the general manager of the Great Atlantic and Pacific Tea Company. His term of office will be six years and his salary $2,500 a year.

—Chief of Police Jones, of Wilkesbarre, Pa., and one of his patrolmen have been sued by a citizen for false imprisonment and brutal treatment, ten thousand dollars being asked. The plaintiff was arrested a short time ago for alleged passing of counterfeit money, but there was no evidence to hold him and he was discharged.

—Chief of Police Taylor of Leavenworth, Kan., is determined to keep all women out of drinking places. Two-thirds of the cutting and shooting affairs, the robberies, etc., are due to the presence of women in saloons. Women will not be allowed to stop in front of saloons and have drinks brought to them; they must keep away altogether.

—Chief W. E. Weir, of the Birmingham, Ala., police force is endeavoring to have the patrolmen settle many petty offenses and so prevent many arrests for frivolous causes. These take up the time of the police courts. If there be sufficient evidence to convict offenders, they will be arrested and brought to justice. He wishes that citizens should call on him at his residence in cases that are urgent so that he may give his personal attention to them.

—After twenty years' service in the fire department of New York, as chief instructor at the firemen's training school, Henry W. McAdam has retired. Chief McAdam is a firm believer in civil service for the department, but thinks that too large a percentage is given to mental ability. At present 65 per cent. is assigned to the mental examination and 35 per cent. to the physical. In the opinion of the Chief they should be equal, for while intelligence is of great value, physical strength is of equal importance in the life of a fireman.

—Chief Becker of the Hamilton, O., fire department has asserted that he will enforce discipline in the department and that the drinking of the men must be stopped when they are on duty. He threatens to suspend any man who shows signs of intoxication while on duty and a repetition of the offense will result in dismissal from the force. While doing service at a fire no man will be allowed to touch liquor. Some of the men become exhausted and feel they must have a drink. The chief does not think this does any good and does not look right and so must be stopped.

LITERATURE ON MUNICIPAL TOPICS

Reviews of Some Important Books—What the Magazines and Reviews Have to Say About Civic Affairs—Municipal Reports Received

Books

A book for the inexperienced city official and for the urban citizen is what S. Whinery calls his *Municipal Public Works,* and such it proves to be on perusal. Written by an experienced engineer, who has "been through the mill," as it were, it can advise the inexperienced city official and show him how to avoid the pitfalls that lie in wait for experienced and inexperienced alike. The author considers each subject of municipal activity from all sides, not failing to point out the weaknesses as well as the strong points, and so impresses the reader as being absolutely impartial, although he may recommend a special method. He does not hesitate to point out how often city officials fail in their duty. Without exception this work should be in the hands of every official and public-spirited citizen who looks after the welfare of his city. It will enable each to judge of the proper course to pursue in any mooted question, uninfluenced by interested persons.

Mr. Whinery devotes the first chapter to a discussion of the "Importance of Municipal Public Works," pointing out the way in which public matters are given but little serious attention by the citizen, who takes them as a matter of course, and not worthy of attention, unless they happen to be so managed that his pocketbook is affected. "Hundreds of his fellow-citizens may be dying as a direct result of causes which he can help to prevent, and which it is the duty of the municipal corporation, of which he is a part, to prevent, and yet he stands idly by without raising a voice in protest or a hand in defense. * * * As long as the elector is careless and indifferent, the elected officers can scarcely be expected to be otherwise." It is a well appreciated fact that officials do not take very seriously the responsibility thrust upon them, yet upon their fidelity, skill and business ability depends the welfare of their fellow-citizens.

In "Municipal Organization," the author speaks especially of the city engineer, his responsibility and the need of great care in his selection. He should be allowed to select his own assistants, inasmuch as he is responsible for their conduct, and would also have better control of them. Inspectors should be carefully selected, as they are the eyes of the city engineer. Too often are they appointed for political purposes. "Competent, fearless and honest inspectors, who will not overlook defective work for a consideration, are in a hopeless minority." Inspectors should be appointed by the city engineer, the best ones coming from the ranks of trained mechanics.

In Chapter III., "Preparations for Municipal Work," the author inveighs against hasty and inadequate preparation for work, due to desire to meet some supposed emergency. The issue of bonds, when kept within bounds, is recommended to pay for work. A combination of bond issue and special assessment is also meritorious. When work is contemplated, a broad scheme should be mapped out, so that future demands may be met with a minimum of cost. Mr. Whinery thinks officials should be permitted to visit other cities when some new work is to be undertaken that valuable information may be obtained. The fact that some degenerate into "junketing trips" is not a valid argument against their utility. "The ideal official must keep abreast of the best theory and practice in municipal business."

"Direct Work *vs.* Contract Work" is a strong chapter. He says that under the direction of competent officials as good work can be done by the contract as by direct system. Under incompetent officials, neither system will yield good results. Under a specially organized department only is success reasonably sure in carrying on work under direct system, and then this department should be as carefully looked after as if it were a contractor.

"Advertising, Opening Bids and Awarding Contracts," "The Contract," "The Contractor," and "The Supervision of Public Work," are the subjects of succeeding chapters, each discussing well the special points falling under its head.

"The Maintenance and Repair of Public Work" should be well studied by official and citizen alike, for many well-grounded but wrong impressions as to the durability of public improvements are clearly pointed out. The large cost of pavement maintenance may be due to the following causes: Inefficient organization and supervision; the poor quality of labor employed—mainly the riffraff of the laboring population; delay in making repairs; repairs improperly done; waste of money in patching old pavements when it would be cheaper to lay new ones.

The chapter on "Economy, Real and False," shows how more economically administration of city affairs could be carried on; how often little judgment is used in paving streets and how the first cost of a pavement is allowed to outweigh future consideration.

"Guaranteeing Public Work" is of such importance that THE MUNICIPAL JOURNAL has published a digest of it in another part of this issue.

The subject of "Special Assessments" was deemed important enough for consideration in a separate chapter. The main point to be considered is the apportioning of expense according to benefit received, and Mr. Whinery points out the mistakes often made in the operation of the foot-front or other systems. Uniform municipal accounting, municipal ownership and the control of quasi-public corporations come in for consideration.

To enumerate all the good points of this book would take more space than can be given it here, but enough has been said to show how much every city official needs to study it. Copies may be secured through THE MUNICIPAL JOURNAL at the publisher's price of $1.50 net.

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Periodicals

The July issue of the *Good Roads Magazine* contains an article by James M. Shepard, U. S. consul at Hamilton, Ont., on *Tar-Macadam Roadways in Ontario.* Illustrations are given of the methods of laying this pavement with cross-sections of the roadway, curb and walks. Extracts from the report of the city engineer tells how the pavement is laid. New York, N. Y. Price $1 a year.

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Municipal Enterprise at Mansfield is the subject of the leading article in *The Municipal Journal* of London, and describes the opening of the electricity works and refuse destructor and the character of the same. Besides supplying motive power, the works will generate electricity for public and private lighting and the introduction of tramways is expected to follow shortly. London, Eng. Price per year, 8s. 8d.

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The Sanitarian for June has two articles of interest to the city official, viz: *Medical Inspection in New York Schools,* by Lydia G. Chace, and *Bituminous Macadam Pavements.* New York, N. Y.

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The Popular Science Monthly for June has an article by E. O. Jordan on *Municipal Hygiene.* New York, N. Y.

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Acetylene Stored and Transported in Safety is the leading article in the July issue of the *Journal* of the Franklin Institute. The author, John S. Seymour, formerly U. S. Commissioner of Patents, in a 5,000 word article discusses the methods of absorbing the gas so that it may be safely transported, gives some of the regulations for its use in different countries and the experiments made along this line. Wilson L. Gill writes of *The School City,* showing that Cuba is the first country in the world to require in its schools the training

given in citizenship by means of this method. He speaks of the few educated persons who take the trouble to attend the primaries or even vote, and blames the colleges and schools for this lack of interest in public affairs shown by their graduates, because the pupils are not given a part in the school management, such as the School City affords. Philadelphia, Pa. Price per year $5.

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In *Philadelphia: Corrupt and Contended,* Lincoln Steffens contributes another of his articles on United States cities that are ruled by "bosses" to the July issue of *McClure's Magazine.* This time he takes the worst of all—Philadelphia. Space would not permit him to go much into detail of the way the city is systematically robbed, but he tells how the whole city is under the control of one man and that U. S. Senator M. S. Quay, who is also the "boss" of the State. He shows how even the "boss" of the city is not supreme but a tool of the Senator, who can make or unmake him at pleasure. The years under the late mayor, S. H. Ashbridge, were the worst of any administration, inasmuch as that gentleman had announced upon entering office that he was going to get all out of it possible for himself. This he did. The well-known contentedness of the citizens with affairs amidst all of the corruption is amply illustrated in many instances by the author. Some of the educated people with whom he talked even justified the corrupt methods of their officials as perfectly proper. New York, N. Y. Price per year $1.

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The Chattanooga Times celebrated its twenty-fifth anniversary on the first of July and issued a special illustrated supplement that would do honor to any paper. A brief history of the paper—which included a history of the city's development—was followed by short accounts of *The Times* from the pens of prominent citizens as they knew the paper. A necrology of some of Chattanooga's prominent citizens was also given. The supplement was well illustrated and attractively gotten up.

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"THE true root, the festering sore spot of Pennsylvania political corruption is the city of Philadelphia." That is the opening sentence of an article in *The Arena* for July on *Philadelphia—A Study of Political Psychology,* by Theophilus Baker. He then proceeds to analyze the situation in that city, and shows that the trouble with the citizens has a two-fold character. First, there is an inability to put into action the high sense of right and wrong that is held by the good citizens. They are lacking in the requisite amount of pugnacity to carry out their ideas. They have a number of good government leagues, which pass numerous well-meaning resolutions, but which rest there and do not carry them out. The author says that they need such a man as Folk, of St. Louis, or Clarke, of Minneapolis, who could accomplish more than all the leagues put together. "They do not punish political criminals in Philadelphia." They detect frauds in the ballot, but do not punish the guilty. "They have no stomach for a 'fight to a finish,'" preferring to accept defeat rather than risk a battle. They are like the people who implored Clarke, of Minneapolis, "to let up" on the criminals after he had proved their guilt, fearing that the criminals or their friends would in some way "get back" at them. The author seems to have solved in part at least the trouble in Philadelphia. New York, N. Y. Price, $2.50 a year.

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The Transactions of the Civil Engineers of Cornell University for 1903 contains several articles of interest to city officials. Ira Judson Coe writes on *The Development of the Portland Cement Industry in the Lehigh Valley,* the great centre for the manufacture of this cement in the United States. He gives a history of the industry, and tells how rapidly it has grown. *The Investigations of the Baltimore Sewerage Commission,* by Kenneth Allen, superintendent of waterworks of Atlantic City, N. J., shows how good a field there exists in that city for the construction of a model sewer system, inasmuch as the engineers will have at their disposal the latest knowledge on the subject and a field in which to work unhampered by old systems that must be incorporated in the new. The author describes the present methods of sewage disposal in Baltimore. In 1859, 1873, 1881 and 1893 the subject of a general sewer system was discussed, and a brief review is given by the author of the attempts made to provide the sewerage. The author also discusses the different methods for disposal of the sewage as considered by the engineers, and describes the ways in which the different projects would be carried out. *Fireproof Building Construction* is an article by Frank W. Skinner, and gives an outline of some types of construction, the conditions for success of any system of fireproofing, and the results attained by different methods tested. Published by the Society of Cornell University, Ithaca, N. Y.

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The June issue of *Midland Municipalities* contains an article by Emmet Steece, city engineer of Burlington, Ia., on *Road and Street Improvements.* The article is short, but gives a practical account of how roads are made and the general cost of each portion of the work, such as the quarrying, crushing of the stone and the paving of the street or road. The approximate cost of brick and asphalt paving is also given. Marshalltown, Pa. Price, $1 a year.

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The Journal of the New England Water Works Association for June is full of interesting articles that every city official should read. George Bowers, city engineer of Lowell, Mass., contributed *Underground Water,* giving suggestions of how to obtain and care for it. This is of interest in view of the fact that all municipalities are finding it necessary to enlarge their water supplies. The author tells how to estimate the amount of water underground, usually an uncertain quantity. Discussion of this paper brought out some further information. E. W. Gowing presents a paper on *How I Reduce Pressure on a Gravity System.* Leonard Metcalf describes *The Echo Lake Dam at Milford, Mass.* Illustrations are given of the progress of the work. *The Water Supply of New Orleans and Its Improvement* is the subject of an article by Robert S. Weston, and gives a description of the water purification investigation which brought out the composition and character of the Mississippi river water, and the methods of purification suggested, viz.: Plain subsidence in basins, supplementary subsidence in basins with the aid of a coagulent, and filtration, either slow or rapid. The conclusion of the investigation was that the water of the city was neither abundant nor satisfactory, and that the rapid filters were the best for the work of purification. Plans of the proposed work accompany the article. John C. Chase gives *A Little Talk about Water Rates,* in which he states that the water department should be conducted as a business enterprise, and that all consumers should pay for water, whether they be private or charitable. *Pipe and Pipe-Laying for the Metropolitan Water Works* is contributed by Caleb M. Saville, a division engineer, who describes the work outlined in the subject, including the cost of laying pipe. Illustrations are given of the work at different sections. Boston, Mass. Price, $3 a year. Issued quarterly.

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Municipal Reports Received

SINCE our last edition we have received a copy of the oil ordinances of the city of Los Angeles, Cal.

A copy of the report of the city engineer of Utica, N. Y., for 1902, has reached us.

We have received a copy of the auditor's report for the city of Pasadena, Cal., for 1902.

City Auditor E. E. Unger, of Los Angeles, Cal., has favored us with his annual report for 1902.

The compliments of John P. Prichard, Street Commissioner of Somerville, Mass., accompanied his annual report for 1902.

We have received the Mayor's annual message and reports of the city officers for Jamestown, N. Y., for 1902-3.

The fifteenth annual report of the municipal government of the city of Nashua, N. H., has been received.

The thirty-sixth annual report of the Commissioners of Water Works of Erie, Pa., has reached us.

The Board of Public Works of Lynn, Mass., has sent us its annual report for 1902.

Chief Ivins D. Applegate, of the fire department of Hoboken, N. J., has sent us his report for 1902-1903.

REVIEW OF MUNICIPAL REPORTS

Workings of Sand and Mechanical Water Filters—Experiment to Show How Meters Lower Water Rates—Municipal Ownership of Gas and Water Plants

Cost of Maintaining Sand Filter

During 1902 the sewers of Poughkeepsie, N. Y., have been in good condition, according to the report of the Board of Public Works. Both the paved and unpaved streets have been cleaned by the department, but the paved streets were to be cleaned after April 1, by contract. The road roller and street scraper have been put to good use. The report of Superintendent of Public Works Charles E. Fowler, on the operation of the waterworks and filtration plant, is of interest. The coal strike did not seriously interfere with the supply of coal, but a comparison of the utility of different kinds of coal is of value to other superintendents. The number of pounds of water evaporated by one pound of coal was found to be as follows: Anthracite, pea, 8.82; anthracite, washery buckwheat, 7.72; one cargo of bituminous at $3.75 a ton, 9.80; bituminous at $5.40 a ton, 8.65. The prices, of course, were influenced by the strike.

The department paid for washed and screened sand delivered at the wharf, $0.75 a cubic yard. The effective size of the sand was 0.26 mm., and the uniformity coefficient 1.38. The total quantity of sand received was 1,986 cubic yards and the average amount unloaded, washed and delivered on beds was 19.4 cubic yards per hour. The total cost amounted to 44.4 cents per cubic yard. Some improvements were made in the washing apparatus and 15.2 cubic yards of sand were washed per hour, the quantity of water used being ten cubic feet to one of sand. The cost of washing the old sand and replacing was 34.5 cents per cubic yard, including the cost of water (5 cents per cubic yard of sand), and the cost of spreading the old sand was 39.3 cents per cubic yard. The old bed was cleaned twelve and the new one fourteen times during the year. Of the 1,161 million gallons pumped, 413 million gallons were lost by leakage, but the interest on the cost of repair was found to be greater than the cost of extra pumpage. The old bed removed 97.46 per cent. of the bacteria in the raw water and the new 93.61 per cent.

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Meters Lower Water Rates

Mr. Willis N. Calkins, Superintendent of Water Works, Rockford, Ill., recommends several things for the improvement of his department. Among these are the metering of the entire city and a thorough test to ascertain what damage has been done to the mains by electrolysis. Regarding the first of these recommendations he points out that the per capita pumpage of the city is 125.8 gallons per day and that this is some 75 gallons per capita more than the highest authorities of water consumption assign for proper per capita consumption. There are 395 metered taps in the city, producing a revenue of over $10,629, and 3,492 unmetered taps, which bring in $29,371. This gives a revenue per metered tap at $26.96 and per unmetered tap, $8.41. Thus 10 per cent. of the metered taps furnish nearly one-quarter of the entire revenue. Thus, if all the taps in the city had been metered, there would have been an excess of revenue for the past year of over $103,000, which would more than compensate for the cost of metering every tap. He further says, "There is no justice or equity in the flat rate, for under such rates the careful consumer is paying for the water wasted by the careless one." Were the entire city metered the fuel bill for pumping would be reduced from 35 to 45 per cent. To illustrate his contention about the good meters would bring to the city, he made a careful test in a house and has drawn a chart showing the effect that small leaks in fixtures have upon the total consumption. Metered services make lower water bills and permit the consumer to sprinkle as long as he desires in place of being restricted to certain hours as at present. He further believes that all meters should be owned by the city and maintained at the expense of the department.

Respecting the second recommendation, he recommends that the inspection of the water mains which was started some time ago, should be completed.

Test of Mechanical Filter

An abstract of the second test of the mechanical filter, at Binghamton, N. Y., is given in the report of the Board of Water Commissioners, of which Mr. John Anderson, superintendent of water works, is secretary. The test was made by Mr. George C. Whipple, of Brooklyn, N. Y., and his report states that the water had an alkalinity more than sufficient to decompose all the alum used. The number of bacteria in the river water varied from 424 to 1.177 per c. c. After passing through the filter, the turbidity was almost completely removed, the color reduced from 21 to 3 and the odor changed from a "decided" vegetable odor to a "very faint" one. The organic matter was reduced more than one-half, and all the iron was removed. The *bacillus coli*, present in the raw water, was removed. The amount of alum used was one-half a grain per gallon. The plant filtered 6,860,000 gallons a day and the amount of water used to wash the sand was 2.53 per cent.

The department's report states that the number of meters has increased during the year, and that all services will be metered where it is shown that water is wasted on account of poor plumbing or where pipes are so placed that water must be kept running to prevent freezing. The tax for family use has been reduced to $3 a year, and the price for metered water to 16 cents per 1,000 gallons.

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Municipal Water and Gas Plants Profitable

Out of the one hundred and thirty-two miles of property which has access to the water system of Duluth, Minn., not over fifty per cent. uses the water, and so upon it falls the burden of paying for the extensive system. On this account the Water Board will not do away with the rental of hydrants which are paid for from the general fund to the water department and affords the only means for making the other fifty per cent. pay something towards the expense of maintaining the water supply. The system was made large in order that it might be adequate for future needs of the now vacant property, which contributes nothing to the cost of maintenance. The owners of this property, by their share in hydrant rentals, contribute towards a reduction in the rates of the users of water.

The water and gas plants have always been operated as one enterprise, and water and gas mains have been laid in the same trench whenever extensions were necessary to either systems. This method has been followed since the city bought the plants. The Water Board requires an income of eight per cent. on the cost of laying both kinds of mains, and the income has been derived in ninety per cent. of the cases from water rates. There are many miles of gas or water mains on which there are few consumers. Superintendent L. N. Case places the total expense of the gas plant, including interest and operating expenses, at $49,110.05. The earnings amount to $55,411.84. An increase of nearly $3,000 was made in the salary list during the last year, due in main part to the eight-hour day and to the increased business of the departments, which amounted to over $20,000 and is growing. The cost of operating and maintaining the water department amounted to $30,961.36; of the gas and water departments, $65,611.06, which, with the interest, aggregated $179,495.72. The earnings were $197,186.01, leaving a surplus of $17,690.29.

A table given in the annual report shows the savings made by the reduction of rates. These were found by calculating on the receipts of any one year the percentage of the reduction in the rates in that period. In 1899 the rates by meter were reduced twenty per cent., and the savings were $12,638.04; in 1900 they were $14,434.02. In 1901 the rates were reduced to one-third of the old, and further reductions in rates are to be made just as soon as the finances will warrant it.

SELF-ILLUMINATING STREET SIGNS

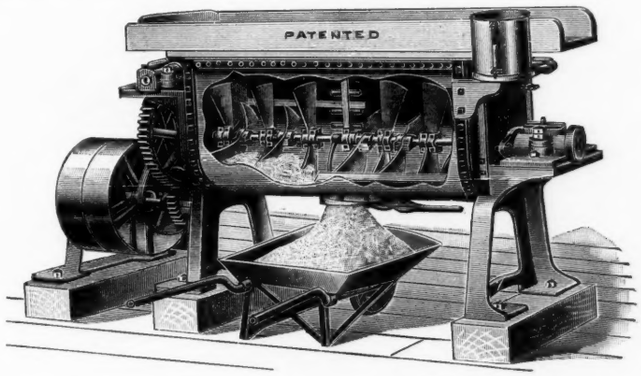
How to have an illuminated street sign without paying for the expense of illumination is the difficult problem which has been solved by the Electrical Reflector Company, of 220 Broadway, New York City. The advantages of an illuminated street sign have always been recognized as important by the city authorities, but they have been deterred from using them because formerly it entailed the expense of a gas or electric light inside for illumination. The ingenious Yankee has come to the rescue and shown us a way to secure the result without the additional expense of an extra light. It is so simply accomplished that we wonder it was not discovered before. The cuts on this page show the different types of lamp posts to which this self-illuminated sign can be adapted. The signs are illuminated by use of reflectors so arranged inside the sign as to utilize the light of the lamp, whether

it be electric or gas, without in any wise interfering with its illumination for street purposes. These signs are legible from a distance of one hundred and fifty feet at night, and the styles shown on this page have been in use in New York for the past year. A contract for their introduction was awarded to the Electrical Reflector Company, after all other signs had been examined, and, moreover, the designs submitted were approved by the Municipal Art Commission, September 23, 1902. These reflector signs are as bright at night as by day, and it should be borne in mind that they are illuminated without any extra cost and that they are artistic and ornamental. There is no reason why cities should not have illuminated street signs, inasmuch as they can be secured at so slight an expense, and especially when the first cost is the only cost.

A Combination Mixer

THE Standard Sand and Foundry Supply Company, of Cleveland, Ohio, is the manufacturer of a complete combined mixing, screening and tempering machine for the most thorough mixing and tempering of all kinds of wet and dry material used in the manufacture of cement building blocks, sand and lime pressed brick, wall plaster and all kinds of sand mixing done in the foundries of all description. The sand mixer is built with direct screen attachment or with screen attached to and above charging hopper with cutoff between hopper and mixer, also provided with the necessary elevators and conveyors for handling the material to and from the machine.

The mixing paddles are so constructed that the material is continually worked from end to end of the machine and is bound to become thoroughly mixed. The mixing paddles and all wearing parts are made of hard steel and malleable iron.



The mixer is also fitted up with patent adjustable cleaning scrapers that keep the material from sticking to the shell of the mixer and allows the paddles to run free and easy, thereby requiring less power to drive and reducing the cost of repairs to a mere trifle.

The shell of the mixer is made of three-sixteenths-inch steel plate. The working shaft, which is two and three-eights inch thick, runs in eighth-inch bearings. The counter gears have a three-inch face and a one and one-quarter-inch pitch. The inside diameter of the mixer is twenty-four inches, while its inside length varies from four to six feet. The machine is also fitted up with a galvanized three-fourths-inch spray pipe running from end to end of the mixer, which has a graduating tank and a globe valve at end, used for wetting and tempering the material in the mixer.

The machine is built strong in every way to stand hard usage. The screen has a two-inch end throw cam motion made of hard steel with adjustable take-up for wear.

This machine has been on the market for the past two years and is being used by the best firms throughout the country. This concern also builds all kinds of elevating machinery and in fact all the necessary machinery for a complete mixing plant.

The firm is a reliable one, having been established for the past twenty-three years.

Dirty Work of the Trust

THE tricks resorted to by the Trust to defeat its competitors, by rights, should act as a boomerang and their evil consequences be visited upon its own head. One of the latest instances of this sort recently appeared in a press clipping from which we quote an abstract of the affidavit made by Mr. Willis W. Byam. It relates to the action brought by the Warren Brothers Company, of Boston, to enjoin the Barber Asphalt Paving Company and its employees from further damaging the pavements of the Warren Brothers Company for the purpose of taking photographs, etc.

"Mr. Byam being duly sworn, deposes and says that he is a resident of Rome, N. Y., and is the attorney for the plaintiff in the above entitled action; that he knows and is well acquainted with George G. Gifford, one of the defendants in said action; that he had a conversation with said Gifford on July 13, 1903, in which conversation the said Gifford said substantially the following: 'I received a telegram from Mr. Graham, of the Barber Asphalt Paving Company, to secure some photographs of the Bituminous Macadam pavement on North James street as they wanted to use them for their benefit at some place where they were endeavoring to secure a contract. What I did I did as agent of the Barber Asphalt Paving Company. I went up there with Mr. Brainerd. We dug holes in the surface of the pavement and dug the surface up so that it looked rough and uneven. When we had fixed the pavement in that way Mr. Brainerd took some pictures of it, which I intend to send in to the Barber Asphalt Paving Company. When there comes a nice hot day I am going up there and do the same thing again and get some more pictures.'

"Mr. Brainerd asked Mr. Gifford if he wasn't afraid the Warren Brothers Company would bring some action against him and he replied that, 'he was working and acting for the Barber people and the next time he went over there on James street he would get some good pictures and give them a cause for action.'"

Carbide Feed Acetylene Generators

THERE are two types of apparatus for producing Acetylene Gas, those in which a limited amount of water is dropped on a mass of calcium carbide, known as "water feed generators," and those in which limited amounts of carbide are dropped into a large volume of water, known as "Carbide feed." Authorities agree that the latter type has advantages over the former. Mechanical difficulties, however, have until now stood in the way of the development of Carbide feed generators.

By securing exclusive rights under valuable patents, and through unexcelled mechanical facilities and inventive abilities, the J. B. Colt Co. have produced a line of generators as unique in their merits as the gas which they produce. The acme of mechanical and inventive ability lies in accomplishing a desired result in the most simple, direct and economical manner. In no mechanism is this fact exemplified to a greater degree than in the "Colt" generators. The results attained are made possible by the use of regular ¼ size crushed carbide, which is not specially prepared and which is sold by the makers at the same price as lump carbide, which by simple and ingenious devices is automatically fed into the water, only as fast as the gas is consumed.

Any person of ordinary intelligence can recharge one of these generators in a few minutes. The residue is of a creamy consistency with practically no odor, and can be poured into any drain pipe or sewer. In fact, where a sewer connection is convenient, the residue flush out pipe of the generator may be connected with it. As the gas is entirely extracted from the residue, no odor of gas escapes into the room.

The "Colt" Acetylene Gas generators are totally unlike any other generators, and are fully protected by patents which broadly cover the principles involved.

There are a lot of unreliable acetylene gas generators manufactured, and when any accident or explosion occurs to an acetylene plant it can be placed to the credit of these imperfect machines, for those manufactured by the J. B. Colt Company give perfect satisfaction, and there is no more need for explosion to occur in their use than in the use of kerosene oil.

California Summer

THERE are vast regions of this land of the orange, in which no one ever complains of the weather. The "joy of living" is felt in August even, for summer is a prolonged spring. The mountains, valleys, the giant forests of the Sierre slopes, the glacial lakes, the redwoods of the Coast Range, the lower terraces near the sea, and the seaside cities have an almose ideal climate; no heat, no sultry nights, no dust, no insects, no storms or clouds; no sudden changes, but tonic, balsamic, bracing air for months together.

Nothing could be finer than the summer weather around Lake Tahoe, or Donner Lake, or about the foot of Mount Shasta, or along the sea coast from Santa Cruz to San Diego, San Francisco is breezy but with a charm of its own, and all its nights are made for sleep. The whole Coast Line of the Southern Pacific offers delightful summer temperature.

Remember the Japan current, then look at the map. Santa Cruz is eighty miles south of Richmond, Va.; it is four hundred miles south of Nice and Mantone; it is in the region of Southern Sicily, Southern Greece and the Island of Smyrna. Farther down the coast are warmer summer seas, but within sound of the surf, the air is like wine from May to November. When the facts are known California will be as famous for its summer weather as it is now for its mild winters. Some of the hotels cannot be excelled anywhere. Nor is it a far region. Any agent of the Southern Pacific will give you full information as to the shortest and best routes, or apply to L. H. Nutting, General Eastern Passenger Agent, 349 or 1 Broadway, New York, N. Y.

The Only Double Track Line

Between Buffalo and Chicago is the Lake Shore and Michigan Southern Railway. There are other ways of going from Buffalo to Chicago, but none which will give the traveler greater ease, comfort and enjoyment, in fact, it is the most interesting route between the East and the West, traversing the richest, finest portion of the Middle States. In the opinion of the experienced traveler it has no superior in perfection of road-bed, punctuality and elegance of service and care of its patrons.

It is known the world over because of its famous fast mail trains for the United States Government, as it won the world's record for fast long-distance speed on October 24, 1895, by making the phenomenal run of 510.1 miles in 470 minutes and 20 seconds, or 65.07 miles per hour.

It is equipped with the most modern Pullman vestibuled sleeping cars, complete in every detail for comfort, pleasure and safety, besides having in service the popular buffet smoking and library cars. Wherever needed, dining cars are run attached to the trains at proper hours for serving meals. The cuisine and service are all that could be desired, equalling that at the best hotels.

Fine day cars are run without change between Chicago and Buffalo, both ways, and as great care is taken to make the passenger of the day coach comfortable and happy as is bestowed upon the one who travels in the luxurious Pullman car.

For full particulars, time table, etc., address A. J. Smith, General Passenger and Ticket Agent, Cleveland, Ohio.

"A Sound Deadener"

There are no public buildings where it is so necessary to reduce all sound to a minimum as in schools and hospitals. The principal noise in these public buildings comes from defective flooring—any floor is considered defective now-a-days which produces a noise when walked over. "The Crown Sanitary Flooring," made by The Robert A. Keasbey Company, 100 North Moore street, New York City, is especially designed to remedy this evil. The governing authorities of hospitals, schools, asylums, and even private individuals, will be interested in the Crown sanitary flooring, not only because it deadens the sound, but also because it is fire-proof, non-absorbent, elastic to the tread, and never becomes slippery, and it will make, therefore, an ideal floor.

The Crown sanitary flooring is a cement put up in barrels or bags, accompanied with liquid, and when mixed in equal proportions forms a plastic combination similar to a rich Portland cement and sharp sand in equal parts. It can be applied to matched flooring, old floors, steel or concrete, any good cement finish or granolithic. The adhesion is perfect and will give a sanitary flooring that will wear equal to any of the cement floorings; and in many places where heavy traffic requires a floor that will not disintegrate by abrasion, is said to give better service. It can be made in several colors and laid without a seam or joints in several other forms to suit the taste and local surroundings. Seventy thousand square feet of Crown sanitary flooring has been in use in the Manhattan State Hospital for over two years. It is also in use in the House of Refuge on Randall's Island; in the store of Tiffany & Company; was used at the Pan-American Exposition; and is extensively used in bath and toilet rooms and on piazza floors. It has many qualities which have not been mentioned. Fuller information can be had by addressing the company.

The "Day" Patent Dumping Wagon

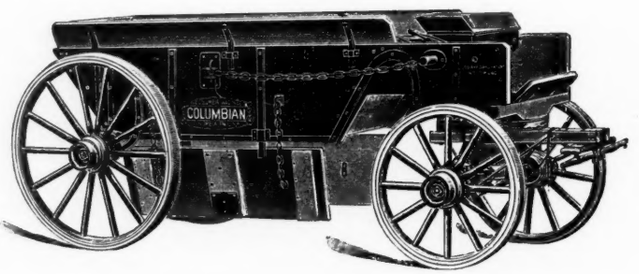
One of the latest patent dumping wagons put on the market is known as the "Day" dump wagon. The Columbia Wagon Company, of Columbia, Penn., is licensed to build and sell this wagon which it feels will supply a long felt want. This company also manufactures a line of contractors' wagons and carts which are fully described in catalogue No. 11, which will be mailed to any address upon request. The merits of the Columbia wagon are given in a special supplement. The accompanying illustrations will give our readers an excellent idea of this new wagon and its operation, as one view shows the wagon with the bottom closed and the other open. Two sizes are built, one with a two-yard and the other with a one and one-half-yard capacity.

AS WAGON APPEARS WHEN LOADED

This wagon is so designed that the wheels turn clear under the body, allowing it to turn within its own length. It is heavily ironed and braced to sustain the hardest kind of steam shovel work. Lighter sizes for other work will be built on special order.

The side boards for the body are one and one-half or two and one-fourth inches thick, as preferred. The bottom boards are made of the best yellow pine; the cleats on bottom are oak; the top edge of bottom board is covered strongly with angle iron to prevent mutilating edges of bottom boards by stone or other rough material while dumping.

The four chain hinges carrying the bottom boards are placed outside the body and bottom boards, and a chafing iron is made in concave shape on the outer edge of the bottom boards. When the bottoms are being closed, this concave steel acts as a guide to the chain hinges in closing the bottoms up.



AS WAGON APPEARS AFTER DUMPING

The chain used to raise and lower the bottom boards is extra heavy; the guide rolls where the chains pass through the body are strong and substantial.

This wagon is constructed on lines of strength adapting it to hard usage with the steam shovel and contractors' use.

The most important feature is the manner in which the bottom boards are hung when the bottoms are being dumped. The upper outside edge of bottom boards rests solidly against the two heavy iron braces. The bottom or dump boards when dumped, hang directly under the sideboards at an angle of about 85 degrees, to the benefit of the entire width of body in opening through which to dump.

The bottom boards rest or fit under the side boards and not inside, as other wagons of similar style are made.

Municipal officials and contractors who wish price-list and further information about this new dumping wagon can secure it by addressing the Columbia Wagon Company, Columbia, Penn.

AMERICAN ROAD ROLLER COMPANY

A LARGE company for the manufacture of steam road rollers, traction engines, street cleaning machinery, separators and gasoline engines, etc., has lately been organized and is now being incorporated under the laws of the State of New York with a capital of $450,000. This company is new in name only, as it is controlled by its president, Mr. William C. Oastler, Associate Member American Society of Civil Engineers of New York, who has been so long and favorably known in the road roller business. The new company has acquired, in addition to the business of Mr. Oastler, the entire plant of the Conger Manufacturing Company, of Groton, N. Y., together with its business in traction, portable and gasoline engines. Mr. Benn Conger, President of the First National Bank, of Groton, N. Y., is the treasurer of the company.

PRODUCT OF NEW PLANT READY FOR SHIPMENT

The business policy of the new Company will be shaped by Mr. Oastler, who, for nearly twenty-five years, has successfully conducted a business in steam road rollers and the manufacture and sale of street cleaning apparatus. The union of these two industries forms a combination which is sure to add luster to the already extensive and enviable reputation of each of the old concerns. The acquisition of the plant of the Conger Manufacturing Company was made possible by the recent death of Mr. Frank Conger, who had just completed the works of his plant. Its modern equipment, which is complete in every particular, makes it one of the most efficient in the country for producing economical and high grade work. Every part of the machinery included in the product of the new Company, except steel castings, will be constructed in the Groton shops. There is a large and well equipped boiler shop, a commodious and well lighted foundry, a machine shop with extensive galleries, electric cranes, and the newest and most approved lathes and other tools, a brass foundry, large wood-work shops—indeed, every appliance for conducting an up-to-date manufacturing plant of this sort.

The plant is now running full time, and the accompanying illustration shows some of its products loaded ready for shipment. For further particulars, address the American Road Roller Company, 156 Fifth Avenue, New York.

NOTES OF INTEREST TO THE TRADE

—Thomas Chalmers, father of W. J. Chalmers, Chairman of the Executive Committee of the Allis-Chalmers Company, died July 13th and was buried Thursday, July 16th. Thomas Chalmers was the founder of the firm of Fraser & Chalmers, which was recognized as the world's largest producer of mining machinery.

—The Eureka Fire Hose Company has just issued a 48-page illustrated booklet showing how the famous Eureka hose is manufactured and how it is used in actual service. It is a catalogue that will be sure to attract attention and can be had for the asking. Address, the Eureka Fire Hose Company, 13 Barclay street, New York.

—The Columbia Engineering Works, Brooklyn, N. Y., has taken up the manufacture of the Arthur Herschmann Patent Steam Wagons and are now building trucks of three and six-tons capacity for municipal purposes, trucking, etc. On application a special catalogue will be mailed to any address.

—The Pan American Company of New York, has recently opened some of the best asphalt producing property in the world at Tampico, Mexico. The Company is now ready to make shipments.

—The United States Sanitary Company, of 485 Missouri avenue, N. W., Washington, D. C., which builds odorless steel sanitary dumping carts and wagons, recently delivered to the War Department at Washington, for shipment abroad, fifty carts. This makes several hundred that have been ordered from this company by the War Department at previous dates.

—Owing to its rapidly increasing business, the Commercial Electric Company, of Indianapolis, Ind., was recently obliged to enlarge its plant. The improvement is now complete and the new plant has a capacity fully four times that of the old one. But even its largely increased capacity will not suffice for long and further extensions will become imperative. The new address of the company is West Twenty-First street and Northwestern avenue.

—The escalator at the Twenty-Third street station of the Sixth avenue Elevated Railroad, which was shut down recently, has resumed regular operation. Some time ago the motor driving the escalator was connected to take current from the third rail. It was found, however, that the voltage fluctuated over a considerably wider range than had been anticipated, and the shut-down was necessary in order that alterations might be made in the motor to secure better speed regulation. During the interval that the electrical changes were in progress, the receipts of the station showed a marked falling off. It will be remerbered that the escalator was installed some years ago by the Otis Elevator Company of New York.

—Mr. George H. Gibson has resigned as manager of the advertising and publication department of the B. F. Sturtevant Company, of Boston, Mass., to accept an appointment with the International Steam Pump Company, having offices at 114-118 Liberty street, New York City. Mr. Gibson was formerly connected with the Westinghouse Companies' Publishing Department, of Pittsburg, Pa., and was for two years a member of the editorial staff of the *Engineering News* of New York City.

—Mr. F. C. Mott, recently associated with Mr. G. M. Gest, has been appointed Manager of the New York office lately opened by the American Conduit Company, manufacturers of the electrolysis proof bituminized fiber conduit. Owing to the large increase in business during the past year, the demand for this material running into many millions of feet, the Company has found it necessary to open this office in addition to the Philadelphia, Chicago, and Los Angeles offices.

CONTRACT NEWS FOR THE MONTH

Including Paving, Sewerage, Water Supply, Lighting, Public Buildings, Sewage and Garbage Disposal, Fire Supplies, Contracts Awarded

N. B.—All news of proposed work sent us by city officials is incorporated in our Weekly Advance News Service and appears subsequently in this "Contract News for the Month" if the date of the reception of bids be sufficiently late to warrant placing the item here.

City officials and others are urged to send us all news of contemplated improvements for use in our Weekly Bulletins which are mailed to those interested.

PAVING, PAVING MACHINERY AND MATERIAL

Allegheny, Pa.—Will pave and grade Morman street and eight others. City Clerk Wills.

Alliance, O.—A petiton has been presented for paving on W. State street.

Anderson, Ind.—A gravel road will be built from Madison to Tipton Cunties. County Commissioners.

Battle Creek, Mich.—$10,000 in bonds will be issued for paving purposes.

Bay City, Mich.—Brick or asphalt will be laid on Henry and Washington streets.

Bixar, Tex.—$500,000 has been voted for road improvements. Co. Clerk.

Boston, Mass.—Bids are wanted August 6th for walks and roads at Ft. Strong. A. M. Palmer, Q. M. 170 Summer street.

Bridgeport, Conn.—The extension of Broad street is under consideration. City Clerk.

Brookline, Mass.—$50,000 will be spent in widening Harvard street.

Chase City, Ia.—The paving of Main street is contemplated.

Cincinnati, O.—Boyd street and 12 others may be paved with brick and macadam. Edwin Henderson, Clerk.

Cleveland, O.—It is considered necessary to macadamize and improve Lower Park Boulevard. Peter Witt, City Clerk. Berea street and fiifty-nine others will be graded and paved with asphalt and paving brick.

Columbus Grove, O.—Two miles of streets will be paved.

Deadwood, S. D.—Three streets have been marked for paving.

Dephia, Ind.—It has been voted to build roads in Deer Creek township to cost $50,000. Co. Surveyor Kirkpatrick.

Denver, Colo.—Brick paving for several streets is to be considered. B. Pub. Works. 90,000 feet of curb will be laid at a cost of over $122,000.

Des Moines, Ia.—Bids are wanted August first for sheet asphalt pavement on West 13th street. B. O. Hanger.

Duluth, Minn.—The property owners want brick paving on Superior street.

E. Cleveland, O.—Wellesley street may be paved with brick. H. B. Chapman.

Essexville, Mich.—Plans for paving are being made by John H. Bloomschield, C. E. $50,000 will be spent on paving Woodside avenue. Village Clerk Gundon.

Freeport, Ill.—Brick or asphalt pavement for Stephenson street is being considered. City Engineer Graham.

Fresno, Cal.—Plans for asphalt and other paving, are now ready. City Engineer.

Galveston, Tex.—The city has provided for the immediate issuance of $500,000 of the $2,000,000 grade raising bonds authorized by the Legislature. Col. S. C. Riche, Engineer.

Grand Rapids, Mich.—It was reported that $150,000 worth of bonds would be sold July 15th to be used for improving the streets. City Clerk J. L. Boer. Brick will be laid on Granville avenue, and grade and gravel on several others.

Grasse Point, Mich.—Jefferson Ave. will be paved at a cost of $25,000.

Greensboro, N. C.—The macadamizing of several streets is under consideration. Guilford Co. Highway Commissioner.

Greenville, Miss.—The city has voted to issue $50,000 in bonds for street improvements, bids for which will be received by W. Yerker, City Clerk.

Greenville, R. I.—$4,000 will be spent on highways and bridges.

Griggsville, Ill.—20,000 feet of concrete walk will be built.

Hamilton, Ont.—Twenty-six streets will be macadamized. City Engineer Barrow.

Harrisburg, Pa.—Paving will be laid on nineteen streets and alleys. City Engineer Cowder.

Harwich, Mass.—$10,000 will be spent for state highway.

Jersey City, N. J.—A petition asks for the extension of Carteret avenue; also Union street.

Lancaster, O.—Plans are being made for 19,000 square yards of brick paving. City Engineer Wolfe.

Lansing, Mich.—It will cost $10,954 to lay brick on Allegan street. City Engineer Collar.

Lockport, N. Y.—Bids are wanted August 3rd for macadamizing on Smith street, 4,200 feet. City Engineer Frehsee.

Lowell, Mass.—$6,500 may be issued for asphalting and macadamizing Gorham street and a number of others. Council Committee.

Mecklenburg, N. C.—A vote will be taken August 11th on an issue of $200,000 in bonds for macadamizing and improving the pubilc roads. J. C. Weddington.

Middleboro, Mass.—$12,000 will be spent on roads.

Mill Valley, Cal.—$37,000 will be spent on roads.

Milwaukee, Wis.—Bids will soon be asked for 15,000 square feet asphalt on East Water street.

Minneapolis, Minn.—Several streets are to be paved, block macadam and sandstone are to be used.

Moline, Ill.—The city is preparing estimates for paving 13th avenue and three others with asphalt and 11th avenue with brick. City Engineer Paddock.

Montreal, Que.—The committee has voted $27,000 for walks. Finance Committee.

Munich, Ind.—More street paving is being considered.

New Orleans, La.—It is estimated that it will cost $13,500 to pave St. Philip and Lopez streets. $50,000 will be spent on repairing the streets.

Ogdensburg, N. Y.—One block of brick will be laid as an experiment. Board Public Works.

Oswego, N. Y.—West Mohawk street will be macadamized and brick laid on West Fifth. Commissioner O'Neill.

Passaic, N. J.—Will probably curb Summer street, asphalt Main avenue and open Howard avenue. City Clerk Watson. May macadamize Ascension street.

Pensacola, Fla.—It was reported that a vote would be taken July 2nd on the question of paving bonds. Mayor Jones.

Port Huron, Mich.—It is estimated that it will cost $44,970 to repave Griswold street with brick. City Engineer Phelps.

Portland, Ore.—Asphalt paving for Marshall street will be planned. City Engineer Elliott.

Princeton, Ind.—Nine miles of stone road will be built in Patoka township.

Rochester, N. Y.—The paving of Caroline street and two others with Medina stone and grading Kusse street, is being considered. T. S. Cluver, City Clerk. The construction of cement walks on Kusse street and several others is also contemplated.

Rome, N. Y.—Asphait on Turin street will be planned for.

Saginaw, Mich—Brick will be laid on Ames, Adams, Clinton and other streets. City Clerk W. H. Barton.

St. Joseph, Mo.—Jackson and 27th streets will be widened. May lay macadam and brick on Mitchell avenue and two streets. Considering paving for Tenth street, Sixth street, and Frederick avenue. Brick is favored. Amazonia Road—1½ miles—will be macadamized.

St. Paul, Minn.—Will macadamize West 7th street at a cost of $50,000. City Engineer Rundlett. Temperance street may be paved with brick at a cost of $11,000.

Salem, Ind.—22 miles of gravel road will be built in Washington and 17 miles in Franklin townships.

Salisbury, N. C.—The city will vote August 4th on issuing $90,000 in bonds for street improvements. The Mayor.

Schenectady, N. Y.—A ten-mile boulevard will be surveyed. City Engineer Trumbull.

Scotdale, Pa.—$40,000 in bonds will be issued for paving purposes.

Sycamore, Ill.—$20,000 will be spent on street paving.

Syracuse, N. Y.—Syracuse brick has been designated for paving Syracuse and West Fayette streets. City Engineer Schnauber.

Taunton, Mass.—The Council voted down $40,000 highway improvement bill.

Texarkana, Tex.—$64,000 will be spent on paving.

Toledo, O.—One mile of road in Providence township will be built. Co. Commissioners.

Trenton, N. J.—The Council has passed a resolution to macadamize Chestnut and Stuyvesant avenues. City Clerk, C. Edward Murray.

Warwick, R. I.—The state road from Cranston to Natick will be macadamized.

Wichita Falls, Tex.—$100,000 in bonds will be issued for road improvements.

York, Neb.—The paving of several streets is under consideration.

CONTRACTS AWARDED.

Bay City, Mich.—The contract has been let for brick pavement on Cass avenue to Patrick Ryan, for $26,208; Adams street pavement to Robert Donahue for $8,121, and for Water street at $7,233. City Council.

Binghamton, N. Y.—The contract for porter block on Conklin avenue has been let A. L. Willey at $1.91 per square yard; A. D. Osborn, Malvern block at $1.90 on Prospect avenue. The contract for grading, macadamizing and curbing 22nd street has been let Dunn & Lollande Bros. for $11,336; laying sidewalk on First avenue to Byron Sounders for $7,857; grading, macadamizing and curbing 13th street to the Birmingham Paving Co. for $4,776. City Council.

Bluffton, Ind.—The contract for five miles of road has been let David Gottschalk.

Buffalo, N. Y.—The contract for repaving Grace street has been let H. P. Burgard for $11,000.

Camden, N. J.—Contract for asphalt paving has been let the Vulcanite Paving Co. at $1.84 per square yard.

Chelsea, Mass.—The contract for street building has been let G. N. Oakes at $7,000.

Chester, Pa.—The contract for paving Lloyd and seven other streets has been let.

Cincinnati, O.—The contract for brick on Columbia avenue and Grayden avenue has been let William Fogarty, 936 Windsor street.

Evanston, Ill.—The contract for macadam on Foster and Noyes streets has been let J. A. McGarry & Co. of Chicago.

Findlay, O.—The contract for brick on East Lima street has been let C. B. Hall & Son.

Frederick, Md.—The contract for street paving has been let J. N. Fritchie & Son of Lancaster, Pa.

Greensboro, N. C.—The contract for 50,000 square yards of macadam has been let A. L. Patterson & Co., Macon, Ga. at $35,000.

Holland, Mich.—The contract for Metropolitan brick on Eighth street let A. Prange, Grand Rapids.

Jacksonville, Fla.—The contract for paving with Coaldale block on Newman and two other streets has been let to J. D. Smith at $1.59; for paving Florida avenue with shell to the same party.

Kingston, N. Y.—The contract for the Ellenville road has been let Casey & Murray at $56,000.

La Crosse, Wis.—The contract for a brick pavement on Third and Fifth streets has been let Wooley & Henson at $31,467.

Little Falls, N. Y.—The contract for a road to Dolgeville has been let J. Walker, Mariners Harbor, at $16,490.

Louisville, Ky.—The contract for paving various streets has been let L. R. Figg & G. W. Gaswell.

Milwaukee, Wis.—The Western Paving & Supply Co. has been awarded the contract for asphalt on East Water street at $2.14 per square yard.

Monmouth, Ill.—The contract for 2,250 feet of brick paving has been let Broadine & Dungan at $3,099.

Newburg, N. Y.—The contract for road to Campbell Hall—13 miles— has been let T. H. Harrington & Son.

Norfolk, Va.—A contract has been let the Southern Paving & Construction Co. for paving Granby street with asphalt.

Omaha, Neb.—The lowest bid for asphalt repairs was received from John Grant—$11,230.

Quincy, Ill.—The contract for macadam on Park Place has been let Henry Reese at $1.07 per square yard.

Renssalaer, N. Y.—The contract for paving Broadway and nine other streets with Mack brick has been awarded Frank Pidgeon at $10,941.

St. Joseph, Mich.—Contract let Karf & Hays for grading two miles of road at 17½ cents per cubic yard.

Versailles, Ind.—The contract for 18 miles of macadam road has been awarded John S. Rogers, Bloomington.

Walden, N. Y.—The contract for Porter block on Main street has been awarded T. H. Allen & Co.

Washington, D. C.—The contract for asphalt repairs for four years has been let Brennan Construction Company at $600,000.

W. Boylston, Mass.—The contract for highway has been let A. Lancier, So. Framington, at $9,000.

Westfield, Mass.—The contract for section three of the storm water sewer has been let the Hartford Paving and Construction Co.

WATER SUPPLY

Ada, I. T.—This city will vote August 8th on a bond issue of $30,000 for the construction of a system of water works. The Mayor.

Alexander City, Ala.—A complete water system will be installed here. Mayor Ferquay.

Alton, Ill.—Municipal water works for this place are being considered.

Baraboo, Wis.—This place has voted $85,000 in bonds for a new plant.

Battle Creek, Mich.—Water filtration is contemplated. City Recorder Storck.

Belding, Mich.—$35,000 water works for this place is talked of.

Cameron, Mo.—This place will put in two duplex pumps, tower, reservoir, pipe and hydrants, for which $59,000 bonds have been voted. Mayor Young.

Cannonsville, N. Y.—The question of water works is under consideration.

Chinook, Mont.—Bids are wanted August 1st for the laying of the distribution pipe system, a steel water tower, a steam pumping plant and a frame pump house. W. F. Marsh, Town Clerk. Bids are wanted August 1st for furnishing cast-iron water pipe and special castings, fire hydrants, valves and valve boxes, an intake and intake well, settling basins. W. F. Marsh, Town Clerk.

Clarksville, Tex.—The question of water works will be voted upon.

Cleveland, O.—The State Board of Health says that the only solution of the water problem is in filtration.

Columbia, S. C.—This place is considered the putting in of a ten-mile pipe line to cost $500,000.

Columbus, Ga.—May build a line to Harris Co.—16 miles—for new water supply.

Diamondville, Wyo.—This place and Kemmerer must put in water works by order of the State Board.

Dillonville, O.—A vote will be taken on the question of issuing $30,000 in bonds for a water and light plant, including pump, reservoir, hydrants, etc. Village Clerk Mercer.

Durant, I. T.—The city will vote on issuing $85,000 in bonds for the construction of a water works system. The Mayor.

E. Grand Forks, Minn.—Water works will be constructed, for which bonds are to be issued. City Recorder Harm.

Elizabeth, Ill.—An ordinance has been voted for water works.

Elmer, N. J.—Water works to cost $25,000, will probably be installed. Borough Clerk Van Meter.

Essexville, Mich.—Plans for water works and paving are being made by John H. Bloomschield, C. E.

Gananoque, Ont.—$120,000 will be spent on water works and sewers.

Genesee, Idaho.—The question of bonds for water works is being considered.

Grand Rapids, Mich.—$80,000 have been voted in bonds for water works extensions.

Great Falls, Mont.—It was reported that bids would be received July 27th for $141,000 worth of bonds for water works purposes.

Gulfport, Tenn.—Plans for water works to cost $60,000 have been made by Supt. Wilcox of the Jackson Water Works Co.

Hawkinsville, Ga.—Plans will be ready August 1st for water works to cost $25,000.

Hotchkiss, Colo.—It is reported that water works to cost $30,000 will doubtless be voted.

Houston, Tex.—A vote will be taken on the question of an $800,000 water works plant.

Kansas City, Mo.—$130,000 will be expended on repairs to the water works.

Kennedy Heights, O.—$11,000 have been voted in bonds for water works.

La Crosse, Wis.—The Board of Public Works wants to rebuild the intake pipes and buy three boilers.

Lafayette, Ala.—Material for constructing a system of water works to be operated by the electric power furnished by the lighting plant, will doubtless be asked for. W. G. Davis.

Laurel, Miss.—This place will spend $12,500 on extending the water works system.

Lawton, O. T.—$100,000 will be spent on water works and sewers.

Louisville, Ga.—Surveys have been made for a water works system, for which $25,000 worth of bonds have been issued.

Lynchburg, Va.—This place has voted to build a $700,000 gravity supply and will need 25 miles of 36-inch main. City Engineer Shaner.

Manistee, Wash.—Water works will be installed. Town Clerk.

Mannsville, N. Y.—Water works are to be built here. Village President.

Marysville, Cal.—It is probable that a vote will be taken on the question of a pumping station and sewer system worth $85,000.

Moline, Ill.—$13,3500 has been appropriated by the Council for water works expenses and $100,000 for improvements. City Council.

Monroe, Ga.—The city will vote August 6th on issuing $30,000 in bonds for the construction of a water works system. The Mayor.

Montpelier, Vt.—A $50,000 filtration plant has been recommended by the State Health Board.

Nantucket, Mass.—The vote in regard to the building of water works in Siasconset, resulted adversely.

New York, N. Y.—$500,000 will be spent on mains and hydrants.

Onway, Mich.—$18,000 in bonds have been voted for water works.

Pensacola, Fla.—The city has voted an issue of $250,000 for the purchase of or construction of water works; $200,000 for a sewerage system; $200,000 for street improvements, and $50,000 for the erection or purchase of an electric plant. The Mayor.

Perth Amboy, N. J.—Bids are wanted August 7th for $80,000 water works bonds. City Treasurer Broadhead.

Rahway, N. J.—A filter may be installed here. H. B. Bunn, Supt. Water Works.

Rome, N. Y.—Gravity water works will be built here.

St. Petersburg, Fla.—The city will issue $23,000 of additional bonds, of which $10,000 will be used for duplicating machinery and extending the water works. The Mayor.

St. Stephens, N. B.—Water works for this place are contemplated. Mayor Murchie.

Santa Barba, Cal.—$40,000 will be spent this year on water tunnel in Santa Yuez Mountains.

Sansalito, Cal.—The estimated cost of water works is placed at $75,000.

Sheboygan, Wis.—City water works are contemplated.

So. Milwaukee, Wis.—Bids are wanted August 1st for 1,800 feet of 18-inch main, pumping station, pumps, boilers, etc. Mayor Franke.

So. Stillwater, Minn.—The water supply at this place will be increased.

Spokane, Wash.—It will cost $20,000 to install water works at Ft. Wright.

Springfield, Tenn.—$35,000 in bonds will be issued for water and light plant bonds.

Storm Lake, Ia.—It is probable that a 500,000-gallon mechanical filter may be put in.

Stowe, Vt.—$20,000 in bonds have been voted for water works.

Strasburg, O.—Water works are to be built here.

Washburn, N. D.—Plans for water works have been drawn.

Washington, D. C.—Bids are wanted August 8th for three hundred fire hydrants. District Commissioners.

W. Homestead, Pa.—The erection of municipal water works is being considered.

W. Manchester, O.—Water works will be planned. Village Clerk Siler.

Whittier, Cal.—Enlargements to the water works are contemplated. Water Commissioner.

Wilton, Me.—Water works are under consideration here.

Wenham, Mass.—This place is obtaining an estimate for the installation of water works.

Yazoo City, Miss.—Mr. W. G. Kirkpatrick of Kirkpatrick & Johnson, Jackson, Miss., writes that bids are wanted August 3rd for 12 miles of 12 to 4-inch c. i. pipe, hydrants, valves, reservoir, steam pumps, etc. E. J. Poursine, City Clerk.

Youngstown, O.—The Council favors $125,000 in bonds for a filtration plant.

CONTRACTS AWARDED.

Ceredo, W. Va.—The contract for the construction of a water works system has been let the Cedero Water & Light Co. at about $14,000.

Cincinnati, O.—The contract for furnishing water pipe and special casting for the water works department has been awarded the Dimmick Pipe Co. of Birmingham, Ala., for $41,200.

Coopersburg, Pa.—The contract for works has been let Bolton G. Coon, Kingston, at $17,500.

Elder, Pa.—The contract for 2½ miles of mains has been let A. M. Bloom and A. M. Fleck of Armagh.

Freeport, Minn.—The contract for water works has been let W. D. Lovell.

Geneva, Ala.—The contract for sinking artesian wells and the construction of water works has been let S. S. Chandler of Albany, Ga., for $14,000.

Goshen, Ind.—A contract has been let Moran & Watson, Elkhart, for a well at the water works. City Clerk Bender.

Great Falls, Mont.—A contract has been let Hoge & Swift, Portland, Ore., for valves, hydrants, etc., at $2,108.

Hanley Falls, Minn.—A contract for water works has been let W. T. Gray & Co. for $6,600.

Little Falls, N. Y.—A contract for laying the mains of the Little Falls Water Company has been let the United Gas & Water Works Construction Co. of New York.

Martinburg, W. Va.—The contract for constructing a water works system has been let Irwin & Koester, of Greenville, O., at $19,154 and for equipment for the pumping station to McGowan & Co., of Cincinnati, O., at $5,331.

Oakland City, Ind.—The contract for water works has been let Laidlaw-Dunn-Gordon Co., Cincinnati, pump; S. A. Parker, Oakland City, boiler; valves, hydrants, etc., T. A. Hardman, Olney, Ill.

Springfield, Vt.—The contract for water works has been let E. C. Crosley, at $95,000.

Sydney Mines, N. S.—The contract for water works has been let Sutherland & McDonald, New Glasgow, N. S.

Tacoma, Wash.—The contract for improving the water works system and constructing a new reservoir has been let F. A. Keasal at $15,774.

Toronto, Ont.—The contract for an engine at the water works has been let the Allis-Chalmers Co. at $155,000.

Tupelo, Miss.—The contract for a sewage system and water works has been let Kirkpatrick & Johnson.

Wilmington, Del.—The contract for water works has been let the U. S. Filtration Co. at $600,000.

PUBLIC BUILDINGS

Ada, Ind. Ter.—This city will vote August 8th on a $15,000 bond issue for erecting new school. The Mayor.

Baltimore, Md.—The question of a new jail is under consideration. Jail Warden Doyle. Plans and specifications for alterations to the court house have been received from Mr. Thomas C. Kennedy, who is receiving bids for construction. McIver & Piel are preparing estimates for the erection of a new school at Powhatan. $260,000 will be appropriated, according to reports, for five schools.

Boonville, Ind.—Bids are wanted August 3rd, for court house to cost $50,000. County Commissioner J. J. Byers.

Carthage, Mo.—This city has voted to issue $75,000 for the erection of a new high school.

Chelsea, Ia.—Bids are wanted August 3, for a school. Secretary Board Education.

Chicago, Ill.—$964,000 will be spent on new schools. Board Education.

Cleveland, O.—This city will issue $50,000 in bonds for the purchase of land and the erection of a market house. Peter Witt, City Clerk.

Corsicana, Tex.—An issue of $150,000 in bonds has been voted for the erection of a court house.

Cripple Creek, Colo.—$75,000 will be spent for a court house here.

Danville, Ky.—A new government building will be asked for this place.

Enid, Ok. Ter.—This city is considering the erection of a $50,000 court house.

Glens Falls, N. Y.—$100,000 in bonds have been voted by this place for a high school.

Greenville, S. C.—The city has voted to issue $20,000 in bonds for the enlargement and improvement of schools. E. L. Hughes, Supervisor.

Hazleton, Pa.—Plans are being made for a high school to cost $60,000.

Jolite, Ill.—A new jail is to be erected here.

Kirksville, Mo.—Bids are wanted August 12th for a U. S. Post Office. J. K. Taylor, Treasury Department, Washington, D. C.

Knoxville, Tenn.—The city will erect a fire hall and city prison. M. T. McTeer, Mayor.

Louisville, Ga.—$50,000 in bonds have been voted for a new court house and jail. R. T. Terrell, Avera, Ga., Chairman, Board Roads and Revenues.

Minneapolis, Minn.—This city will spend $100,000 on a new jail.

Monroe, La.—It was reported that a vote would be taken July 22nd on a tax for a city hall, market, prison and engine house. The Mayor.

Moultrie, Ga.—The city will vote on issuing $15,000 in bonds for erecting a new school. The Mayor.

New Orleans, La.—An annex to the city hall will be built at an expense of $112,000.

Owasso, Mich.—Plans for a $75,000 court house have been accepted. Board of Supervisors.

Pensacola, Fla.—City has voted to issue $50,000 in bonds for the erection of a new city hall. The Mayor.

(Continued on page 33.)

Portland, Ore.—Bids are wanted August 11th for an extension to the court house. J. K. Taylor, Treasury Department, Washington, D. C.

Raleigh, N. C.—$300,000 will be spent on a State Capitol.

Richmond, Va.—Plans for a $1,000,000 post office and court house are wanted.

Salt Lake City, Utah.—Plans for a new court house are to be made by F. O. Woods, of Ogden.

Savannah, Ga.—A contract will be let in October for a city hall to cost $150,000. H. W. Witcover, Architect.

Seattle, Wash.—$400,000 in bonds will be issued for schools.

So. Omaha, Neb.—$100,000 school bonds have been voted here. City Clerk.

Temple, Ga.—The city has voted to issue $5,000 in bonds for a new school and bids are being asked for. The Mayor.

Winnipeg, Man.—It was reported that $75,000 school bonds would be sold July 22nd.

Woodstock, Ill.—A new school will be erected here at a cost of $25,000. W. W. Abell, Architect., Elgin.

CONTRACTS AWARDED.

Aberdeen, S. D.—The contract for a normal school has been let G. O. Kessler, Sioux Falls, at $27,700.

Alexandria, Va.—The contract for an addition to the post office and customs house has been let William P. Lipscomb, at $52,970.

Athens, Ga.—The contract for erecting the new Peabody library has been awarded George A. Clayton & Co., Atlanta, Ga., at $40,840.

Cleveland, O.—The contract for the Mill street school has been let Michael Hewitz at $43,000.

Elsie, Mich.—James G. Nordelle, of Grand Rapids, has been awarded the contract for a new school at $14,162.

Ft. Washington, Md.—The contract for erecting barracks at Ft. Washington has been let to James H. Coster, of Baltimore, Md., at $40,000.

Hamilton, O.—The contract for a new hospital has been let H. Hariz & Co. for $76,400. Board Trustees.

Harper's Ferry, Va.—The contract for a high school has been let J. R. Wilson, Wheeling, at $48,876.

Hot Springs, Ark.—T. W. Gibbs has been awarded the contract for the city hall at $28,000.

Johnson City, Tenn.—The contract for four barracks at the Soldiers' Home at $192,000, and for the Carnegie Library at $50,000 has been let J. G. Unkefer.

Kansas City, Mo.—The contract for a new addition to the Hyde Park school, has ben let Flannigan Brothers at $15,992, and for building new school, at $12,236.

McMinnsville, Tenn.—The contract for a new jail has been awarded the Pauly Jail Company of St. Louis, Mo., at $6,000.

Orange, Tex.—The contract for a county jail has been awarded L. T. Noyes, of Houston.

Peru, Ill.—Ed. F. Waugh, 820 E. McClure Ave., Peoria, has been awarded the contract for a school at $28,000.

Pine Grove, W. Va.—The contract for a new court house has been let Clell Smith of Clarksburg, W. Va., at $19,000.

Plainview, Minn.—The contract for a school has been let L. Smith, So. Kankauna, Wis., at $27,999.

St. Louis, Mo.—The C. Stafford Construction Company has been awarded the contract for a new fire engine house at $22,950.

Stillwater, Minn.—J. W. Miller, St. Paul, bid the lowest for the post office at $45,570.

Yankton, S. D.—The contract for a court house has been let Rowles & Bailey, Omaha, Neb., at $54,792. Co. Audr. C. L. Lawrence.

Yonkers, N. Y.—The contract for a school on Park Hill Ave. has been let Lynch & Larkins at $92,700.

SEWERS

Albert Lea, Minn.—Plans for 2,000 feet of 36 to 48-inch brick sewers are ready. City Engineer Barneck.

Athens, Ala.—The city will vote on August 24th on an issue of $12,000 in bonds for the construction of a sewerage system. The Mayor.

Bellows Falls, Vt.—Reports from here state that a sewer system will be placed in Gageville.

Berkeley, Cal.—Sewers will be placed in several streets.

Bessemer, Colo.—Sewer construction is being considered at this place.

Canton, O.—An estimate of the cost of constructing a sanitary sewer system will be prepared. Engineer Phil. Weber.

Chanute, Kan.—A sewer will be built here at a cost of $10,000. City Engr. Lee.

Des Moines, Ia.—Bids are wanted August 1st for a 12-inch vitrified clay pipe sewer on Clark street. B. O. Hanger, Board of Public Works.

Elizabethtown, Ky.—Plans for a sewer system are being made. City Engr. Parson, Louisville.

Fargo, N. D.—A sewer system is being considered here.

Genesseo, Ill.—A sew system is being contemplated for this place.

Ingram, Pa.—Reports state that the issue of $30,000 in bonds for sewers and street improvement is probable.

Lakewood, O.—A sewer will doubtless be laid on four different streets. Henry J. Sensel, Village Clerk.

Las Vegas, N. M.—Plans for sewers will be made. City Clerk Tamme.

Lestershire, N. Y.—A sewer system for this place is being discussed.

Marlboro, Mass.—$35,000 will be spent on a sewer system.

Marysville, Cal.—The city has voted to issue $64,000 in bonds for a sanitary sewer system

Memphis, Tenn.—Ten miles of a sewer extension are to be made at a cost of $50,000. City Engineer Omberg.

(Continued on page 34.)

Moultrie, Ga.—The city will vote on an issue of $35,000 in bonds for the construction of a sewerage system.

Newark, N. J.—The Passaic Valley Commission has voted to issue $1,000,000 in bonds for a sewer.

Newport, R. I.—A sewer system for this place is contemplated at a cost of $20,000.

Quincy, Mass.—$70,000 can be spent on sewer extension.

St. Paul, Minn.—It was reported that bids would be asked for sewers in three streets.

Sumter, Ore.—It was reported that a vote would be taken on the issuing of $15,000 in bonds for sewers.

Trenton, Mo.—This place has under consideration the question of a sewer system.

Union, S. C.—Bids will be asked August 4th for ten miles 8 to 18-inch pipe sewers. Sewerage Commission.

Vancouver, B. C.—This place will vote on a bond issue of $130,000 for sewers.

Wichita, Kan.—Plans for a storm sewer will be made by Wynkoop Kiersted, Kansas City.

Yazoo City, Miss.—Mr. W. K. Kirkpatrick, of Kirkpatrick & Johnson, Jackson, Miss., writes that bids are wanted August 3d for eleven miles of 18 to 6-inch pipe sewers complete, centrifugal pumps and engines. E. J. Parsons, City Clerk.

CONTRACTS AWARDED.

Calumet, Mich.—The contract for sewer in Sheldon street has been let J. H. Green & Sons, Appleton, Wis., at $17,600.

Chester, Pa.—The contract for constructing 18-inch terracotta pipe sewer in Madison street at $1.65; Pussey street, at $1.75; Fourth street, at $1.85 and Highland avenue at $3.50 has been let Martin Bunyea, and Third street to W. E. Riley.

Coldwater, Mich.—A contract has been let C. W. McKinney, Toledo, for storm sewers.

Eugene, Ore.—A contract for sewers has been awarded Simon Kloodahl at $19,650.

Greensboro, N. C.—A contract has been let Guild & Co., Chattanooga, Tenn., for laying seven miles of 12 and 24-inch pipe sewers at $28,990.

Harrisburg, Pa.—A contract has been let W. H. Opperman for the Seneca street sewer at $10,500.

Hartford, Conn.—The contract for the Franklin avenue sewer outlet has been awarded Michael O'Neill.

Houghton, Mich.—A contract has been let J. H. Green & Sons for a sewer in Shelden street at $17,663.

Jersey Shore, Pa.—A contract for sewers in District No. 1 has been let W. H. Herr, Altoona, at $15,927.

La Crosse, Wis.—A contract has been let Thill & Lapitz for sewers in Sparta street at $4,375.

Nashville, Tenn.—A contract has been awarded J. E. Le Sueur & Co. for a sewer.

Newark, N. J.—A contract has been let William J. McCloud & Co. for a sewer in South Orange Avenue, at $12,500.

N. Yakima, Wash.—A contract for a sewer in Seventh street has been awarded J. P. McCafferty at $4,637.

Paris, Ill.—A contract has been let J. Busher for 10,000 feet of sanitary sewer at $5,047.

Pendleton, Ore.—A contract has been let Rigby Clove Mfg. Co. for sewer castings.

Port Townsend, Wash.—A contract has been let Jones & Croten for sewer extension at Ft. Flagler.

Rockford, Ill.—The contract for the Kent Creek sewer has been let G. Maffioli at $47,142.

Sacramento, Cal.—The contract for pipe sewer in an alley has been let A. Moore. City Clerk Desmond.

St. Louis, Mo.—Fred Hoffman & Co. have been awarded the contract for repairs to the sewers.

St. Paul, Minn.—The contract for sewers has been let W. J. Preston at $2,970.

Schenectady, N. Y.—The contract for a sanitary sewer—700 feet—has been let Kellam & Shaffer at $1,120.

Sunderland, Mass.—The contract for sewer system has been awarded C. L. Godard, Athol, at $6,500.

Terre Haute, Ind.—The contract for a pipe sewer in South Eighth street has been awarded Braxton Cox.

Whitesboro, N. Y.—The contract for a sewer system has been awarded George Miller & Co., Oneida, for $6,950.

LIGHTING AND TELEPHONE

Abbeville, Ga.—The Abbeville Electric Light Company will purchase an equipment for an electric light plant.

Akron, O.—It is reported that bids will be asked for 2,000 vapor lights. Board Public Service.

Asheville, N. C.—The Asheville Telephone and Telegraph Co. has been chartered with an authorized capital of $50,000.

Athens, O.—It is reported that an electric light plant to cost $15,000 may be installed.

Aurelia, Ia.—This place has voted franchises for light and water works. Mayor Mummet.

Baltimore, Md.—A municipal electric light plant is under consideration here.

(*Continued on page 35.*)

Barnesville, Ga.—This city will have an electric light plant.

Bisbee, Ariz.—A new electric light plant will be installed. Phelps, Dodge & Co.

Boyne City, Mich.—An electric light plant to cost $20,000 will be installed at this place.

Bruce Mines, Ont.—Plans are wanted by the Mayor for water and light systems which are to be installed here.

Buckhannon, W. Va.—The Buckhannon Telephone Company has been incorporated with a capital of $25,000. J. W. Downs.

Casselton, N. D.—Bids are wanted August 3rd for an electric light plant. City Auditor Youells.

Chanute, Kan.—An electric light plant will be installed at this place. Mayor Kennedy.

Cleveland, O.—The Finance Committee of the Council has approved the plan to ascertain estimates for a municipal electric light plant. An electric lighting plant will be purchased for the Kirtland street pumping station. Peter Witt, city clerk.

Congers, Ga.—A vote will be taken on an electric plant and works for the city.

Carolem, N. C.—The Henrietta Carolem Telephone Company has been incoporated with a capital of $10,000. Ed. Thompson.

Carona, Cal.—A gas plant franchise is asked by M. W. Findlay. This city voted against an issue of bonds for an electric plant.

Dickson, Tenn.—This place has voted to build an electric light and water works plants. City Recorder Warren.

Elba, Va.—The Elba Telephone Company has been incorporated with a capital of $5,000. R. T. Ramsey.

Ely, Mo.—The Union Valley Telephone Company has been incorporated with a capital of $3,600.

Findlay, O.—Specifications for city lighting are under consideration.

Fort Smith, Ark.—An ordinance for an electric light plant is being prepared.

Fox Lake, Wis.—This place has voted $7,000 in bonds for a gas plant. Village Clerk O'Connell.

Hartwell, Ga.—A vote will be taken on the question of a municipal light plant.

Kennebunk, Me.—$6,000 has been voted for the rebuilding of the municipal electric plant.

Kilbourn, Wis.—This place is considering the erection of an electric plant. Village Trustees.

(*Continued on page 36.*)

La Crosse, Wis.—All electric wires on brick paved streets must go underground.

Lake Charles, La.—A gas plant may be put in at this place.

Litchfield, Minn.—$5,000 will be spent in improving the electric light plant.

Lucknow, Ont.—The probabilities are that an electric light plant will be installed.

Lumberton, N. C.—Plans for a $10,000 electric light plant are to be made by W. D. Marrow, Charlotte, N. C.

Madison, Me.—It will cost $42,000 to install an electric light plant at this place. Dr. W. G. Sawyer.

Millers Falls, Mass.—An electric plant to cost $10,000 has been voted. Town Clerk.

Mt. Ayr, Ia.—This place is considering gas lighting. Mayor Thomas Liggett.

Oceana, W. Va.—The Wyoming Telephone and Development Co. has been incorporated. enton Coldwell, Parkersburg, W. Va.

Paris, Tex.—The American Telephone Company has been incorporated with a capital of $50,000. A. H. O'Neill.

Payson, U.—Will buy dynamo, engine, etc., for electric plant of the city. The Mayor.

Penn Yan, N. Y.—The question of an electric plant is being considered. Village Trustees.

Pensacola, Fla.—Bonds for an electric light plant have been voted. City Clerk Jones.

Potsdam, N. Y.—A vote will be taken in August on the question of a municipal electric light plant. Village President Lewis.

San Antonio, Tex.—An ordinance has been introduced asking for an election to vote on issuing $150,000 in bonds for a municipal electric light plant. Alderman Sallisway.

San Francisco, Cal.—Bids are wanted August 1, for a power plant, by the Kaweah River Power Company. Leon M. Hall, Hayward Building, Engineer. The San Francisco Electric Protective Company will put in a new system of conduits for electric wires.

Senatobia, Miss.—This city has voted to issue $6,500 in bonds for the construction of an electric light plant. The Mayor.

Springfield, U.—$20,000 worth of electric light bonds have been sold.

Trenton, Tenn.—The city will vote on August 12th on an issue of bonds for the erection of an electric light plant. The Mayor.

Troy, N. Y.—Rensselaer Co. Board of Supervisors may install an electric light plant to light the county buildings.

Tuckerton, N. J.—The Tuckerton Gas Co. has been incorporated with a capital of $25,000, by F. R. Austin, W. C. Austin, John H. Well, etc.

Versailles, Ky.—The Cumberland Telephone and Telegraph Company has applied for a franchise to establish exchanges at Versailles.

Vidalia, La.—This place is considering the installation of an electric light system. The Mayor.

Waxahachie, Tex.—This place voted against an electric light plant. Mayor Ross.

Weeping Water, Neb.—An acetylene gas plant is being considered here. Elmer Noyes, Elmwood.

Wellsville, O.—This place recently voted against the proposition to issue $20,000 electric light bonds.

Williamsburg, O.—The recent election resulted in the defeat of the proposition to isue bonds for electric light plant.

Windsor, Ont.—New generators, etc., for the city electric plant are talked of.

Yazoo City, Miss.—Mr. W. G. Kirkpatrick, of Kirkpatrick & Johnson, Jackson, Miss., writes that bids are wanted August 3rd for 450 h. p. Scotch marine or water tube boilers, 200 and 100 k. w. polyphase alternators direct-connected to compound-condensing engines, switch-board, lamps, transformers, etc. City Clerk Poursine.

CONTRACTS AWARDED.

Boonville, N. Y.—The contract for a dam for the village light plant has been let Beardsley Dam & Gravity Co., Elkhart, Ind.

Boston, Mass.—Edwin C. Lewis bid the lowest for electric work at Deer Island House of Correction, his bid being $23,336.

Buckhorn, N. C.—The contract for constructing the electric power plant of the Cape Fear Electric Power Co., has been let Pepper & Register.

Buhl, Minn.—The contract for an electric light plant has been awarded the Northern Electric Company, Duluth, at $3,705.

Des Moines, Ia.—The contract for laying eight miles of conduit for the Edison Electric Light Company has been let George King. Des Moines Clay Works has the contract for the conduits.

Ft. Bayard, N. M.—The lowest bid for the electric light plant was made by Kenner & Lethman, Denver, Colo.

Hagerstown, Md.—The Hagerstown Gas Company has awarded the contract for improvements to its plant to cost about $20,000.

Lebanon, Pa.—The contract for street lights for ten years has been let the Edison Company at $79.92 per arc and $16.80 for incandescents.

Manchester, N. Y.—The contract for ten year street lighting has been let the Ontario Light & Traction Co., Canandaigua.

Newark, N. J.—A contract has been let the United Electric Co. for five years for city lighting, at $95 per lamp per annum.

Ocean Springs, Miss.—The city has granted a franchise to and contracted with the Biloxi Electric Railway and Power Co., of Biloxi, Miss., for electric lighting.

Portland, Ore.—The contract for street lighting for five years has been let the Portland General Electric Company, at $54,000 per year.

Rockville, Md.—The contract for lighting the streets has been let J. Schreiber, Baltimore, at $1,500 per year. He will put in new machinery.

St. Charles, Minn.—The contract for an electric light plant has been awarded the American Electric Company, at $9,990.

San Jose, Cal.—The contract for city lighting has been let the United Gas and Electric Company for five years at $3.80 per light. City Council.

FIRE APPARATUS.

Appleton, Wis.—This city is in need of fire protection. Chief, Fire Department.

Bakersfield, Cal.—Bonds for better fire protection are being planned for.

Baltimore, Md.—The contract for 10,000 feet fabric fire hose has been let The Boston Wovenhose and Rubber Company at 53 cents per lineal foot. Municipal Board of Awards.

Blue Island, Ill.—A fire company has been formed here. Jos. B. Lechmer.

(*Concluded on page 37.*)

Chester Hill, Pa.—A fire company has been formed.

E. Hartford, Conn.—A petition asks for more hose, other supplies and fire alarm system.

Enhant, Pa.—This place will provide for fire protection. Dr. D. W. Schaffner.

Fargo, N. D.—This city may purchase two chemical engines, hook and ladder and erect a fire hall.

Gonzales, Tex.—A contract has been let for a combination chemical engine and hook and ladder truck and hose wagon, to Seagraves Co. of Columbus, O., for $2,750. City Council.

Holland, Tex.—This place has organized a fire department.

Lawrence, Mass.—The fire commissioner has recommended 3,000 feet of hose and two combination hose and chemical wagons.

Martins Ferry, W. Va.—This place will endeavor to buy an automobile hose wagon.

Milwaukee, Wis.—Underwriters demand better fire protection, including five engines.

No. Bergen, N. J.—A fire company has been formed. J. Van Gilder, foreman.

Parkland, Ky.—The citizens of this place desire a steam fire engine.

Perth Amboy, N. J.—A volunteer fire company will be organized here.

Portland, Ore.—A combination hose and chemical wagon will be purchased. Chief Campbell.

Rochester, N. Y.—It is probable that eighty hydrants will be installed and 3,000 feet of new hose will doubtless be purchased. Comr. Public Safety.

W. Seneca, N. Y.—The residents of the Ridge Road will organize a volunteer department.

Wilkes-Barre, Pa.—A new fire and police call system may be installed.

Wheeling, W. Va.—This place may purchase a new fire engine, new hose, nozzles and fire alarm boxes. Council Committee.

MISCELLANEOUS

Ashland, Pa.—This place is considering a method for disposing of its garbage. Boro Clerk.

Buffalo, N. Y.—The scheme for a sewerage pumping plant which was suggested by Comr. Ward, has been approved by the Council.

Burlington, Ia.—Information in regard to the disposal of garbage is being collected here. City Engineer Steece.

Chicago, Ill.—$4,000,000 in bonds will be issued for park purposes.

Cleveland, O.—Street flushing machines are to be purchased at an expense of $7,000. An equipment for the collection and disposal of garbage will be obtained at a cost of $5,000,000. A city garbage plant may be built.

Dallas, Tex.—It was reported that a vote would be taken on July 10th on a bond issue for parks.

Dayton, O.—The destruction of refuse and garbage is under consideration by the citizens of this place. Board Public Service.

Fairmount, Ind.—This place is contemplating the disposal of garbage. Town Board.

Findlay, O.—Different methods for garbage collection and disposal are under consideration by the health board.

Georgetown, D. C.—A petition for a park has been signed by the citizens.

Hartford, Conn.—Twelve drinking fountains have been voted erected at this place.

Hoboken, N. J.—An ordinace has been introduced to compel the placing of wires underground.

Los Angeles, Cal.—A contract has been let Spreckles Bros. Commercial Co. for 6,500 barrels cement at $3.24 for water department.

Malone, N. Y.—Plans for a sewage disposal plant at Lake Placid has been prepared and bids will soon be wanted. Charles E. Collins, Engr., Drexel Bldg., Philadelphia, Pa.

Memphis, Tenn.—Press reports state that people are asking for more parks.

New Orleans, La.—The purchase of nve large street sweepers and twelve hand machines asked by Progressive Union.

Omaha, Neb.—Cremation for garbage disposal is favored by City Engineer Victor Rosewater.

St. Louis, Mo.—Mayor Wells urges action on garbage question and recommends a crematory.

St. Louis, Mo.—$170,000 has been appropriated for street cleaning purposes.

Sandusky, O.—The question of collection and disposal of garbage is being considered.

Notice to Contractors

CANONSBURG, PA., June 18, 1903.

Sealed proposals for the grading, paving, curbing, and otherwise improving East College Street, about 2,500 feet. Part of the 3½ miles to be let of the Borough of Canonsburg, Washington County, Pa., will be received until Monday, August 10, at 7.30 P. M., at which time proposals will be opened and read. Check $1,000, bond one-half estimated amount of work.

Plans may be seen at Council Chamber and specifications and form of proposals obtained from Borough Clerk. Council reserves the right to reject any and all bids.

R. H. COULTER, President of Council.
GEO. C. MCPEAKE, Clerk. O. K. TAYLOR, JR., Borough Engineer.